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M.Sc. [Information Technology]

IV - Semester

313 43

CLOUD COMPUTING

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SYLLABI-BOOK MAPPING TABLE

Cloud Computing

Syllabi	Mapping in Book
BLOCK I: FUNDAMENTALS **Unit-1: Introduction to Cloud Computing:** Cloud Computing-History-Working of Cloud computing-Cloud computing today-Pros and cons of cloud Computing-Benefits of cloud computing **Unit-2: Non users of Cloud computing:** Developing cloud services-Pros and cons of Cloud service Development **Unit-3:** Types of Cloud Service Development-Discovering Cloud services development services and tools.	**Unit 1:** Fundamentals **(Pages 1 -13);** **Unit 2:** Non users of Cloud computing **(Pages 14-18);** **Unit 3:** Types of Cloud Service Development **(Pages 19-24)**
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BLOCK IV: ISSUES IN CLOUD **Unit-10**: Federation in cloud-four levels if federation-Privacy in cloud **Unit-11: Security in cloud-Software as a security service-Case study: Aneka-service level agreements** **Unit-12: Cloud Storage:** Overview of cloud storage-cloud storage provides-Amazon S3-Cloud file system-Map Reduce-Hadoop	**Unit 10:** Federation in cloud **(Pages 93-100);** **Unit 11:** Security in cloud **(Pages 101-110);** **Unit 12:** Cloud Storage **(Pages 111-127)**

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BLOCK-I FUNDAMENTALS

UNIT 1 INTRODUCTION TO CLOUD COMPUTING

Structure

1.0 INTRODUCTION

Cloud computing is the delivery of different services through the Internet. These resources include tools and applications like data storage, servers, databases, networking, and software. Rather than keeping files on a proprietary hard drive or local storage device, cloud-based storage makes it possible to save them to a remote database.

Cloud computing is a popular option for people and businesses for a number of reasons including cost savings, increased productivity, speed and efficiency, performance, and security.

1.1 OBJECTIVE

After going through the unit you will be able to;

- Understand the fundamentals of cloud computing
- Know about the History of cloud computing
- Discuss about advantages and disadvantages of cloud computing

1.2 CLOUD COMPUTING - WHAT IT IS AND WHAT IT ISN'T

Software programs could be run in traditional desktop computer by your own accesses. The documents you create are stored on the computer on which they were created. Although documents can be accessed from other computers on the network, they can't be accessed by computers outside the network. The software programs you use aren't run from your personal computer, but are rather stored on servers accessed via the Internet. Unlike traditional computing, this cloud computing model is not PC centric, it is document-centric.

1.2.1 What Cloud Computing Is

The cloud is a large group of interconnected computers and these computers can be personal computers or network servers and even they can be public or private. For example, Google's cloud is a private one (that is, Google owns it) that is publicly accessible (by Google's users).

This cloud of computers extends beyond a single company or enterprise. The applications and data served by the cloud are available to broad group of users, cross-enterprise and cross-platform. i.e. Any authorized user can access these docs and apps from any computer over any Internet connection. And, to the user, the technology and infrastructure behind the cloud is invisible. It isn't apparent whether cloud services are based on HTTP, HTML, XML, JavaScript, or other specific technologies. There are six key properties of cloud computing:

- **Cloud computing is user-centric:** The users who are connected to the cloud store their documents, messages, images, and applications. In addition, they can also share it with others. i.e. any device that accesses your data in the cloud also becomes yours.

- **Cloud computing is task-centric:** The main focus is what you need done and how the application can do it for you instead of focusing what it can do for you. Traditional applications like word processing, spreadsheets, email, and so on are becoming less important than the documents they create.

- **Cloud computing is powerful:** Connecting hundreds or thousands of computers together in a cloud creates a wealth of computing power impossible with a single desktop PC.

- **Cloud computing is accessible:** Because of storing the data in the cloud, users can instantly retrieve more information from multiple repositories. There is no limitation just like desktop PC.

- **Cloud computing is intelligent:** Various numerous data stored on the computers in a cloud, therefore analysing and accessing that information should be in an intelligent manner.

- **Cloud computing is programmable:** To maintain the integrity, the cloud computing tasks must be automated. For example, information stored on a single computer in the cloud must be replicated on other computers in the cloud.

1.2.2 What Cloud Computing Isn't

First, we should understand that cloud computing isn't network computing. In network computing, applications or documents are hosted on a single company's server and accessed over the company's network. However, Cloud computing is a lot bigger than that. It covers multiple companies, multiple servers and multiple networks.

Also, unlike network computing; cloud services and storage are accessible from anywhere in the world over an internet connection. With network computing, access is over the company's network only.

Cloud computing also isn't traditional outsourcing, where a company outsources its computing services to an outside firm. While an outsourcing firm might host a company's data or applications, those documents and programs are only accessible to the company's employees via the company's network, not to the entire world via the Internet.

1.3 HISTORY

Cloud computing has past history both client/server computing and peer-to-peer distributed computing. These are all for how centralized storage facilitates collaboration and how multiple computers work together to increase computing power.

1.3.1 Distributed Computing: Providing More Computing Power

A distributed system contains multiple nodes that are physically separate but linked together using the network. All the nodes in this system communicate with each other and handle processes in tandem. Each of these nodes contains a small part of the distributed operating system software. The nodes in the distributed systems can be arranged in the form

of client/server systems or peer to peer systems. Details about these are as follows:

1.3.2 Client/Server Computing: Centralized Applications and Storage

As name suggests, in client server computing the clients sends request and the server provides the reply for the request received by client. A server can have multiple clients at the same time while a client is in make contact with only one server. The Fig.1.1 shows the client server systems.

- The client server computing works with a system of request and response. The client sends a request to the server and the server responds with the desired information.
- The client and server should follow a common communication protocol so they can easily interact with each other. All the communication protocols are available at the application layer.
- A server can only accommodate a limited number of client requests at a time. So it uses a system based to priority to respond to the requests.
- An example of a client server computing system is a web server. It returns the web pages to the clients that requested them.

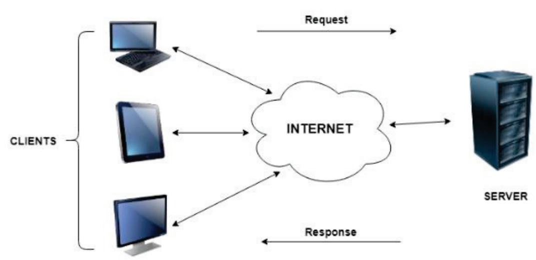


Fig.1.1 Client Server System

1.3.3 Peer-to-Peer Computing: Sharing Resources

The peer-to-peer computing architecture contains nodes that are equal participants in data sharing. All the tasks are equally divided between all the nodes. The nodes interact with each other as required as share resources. The Fig.1.2 shows the peer-to-peer computing systems.

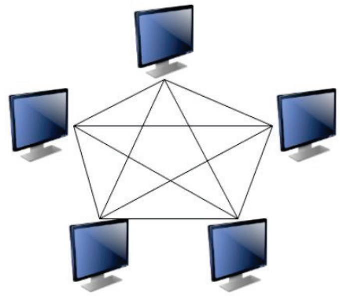


Fig.1.2 Peer-to-Peer computing system

- Peer to peer networks are usually formed by groups of a dozen or less computers. These computers all store their data using individual security but also share data with all the other nodes.
- The nodes in peer to peer networks both use resources and provide resources. So, if the nodes increase, then the resource sharing capacity of the peer to peer network increases. This is different than client server networks where the server gets overwhelmed if the nodes increase.
- Since nodes in peer to peer networks act as both clients and servers, it is difficult to provide adequate security for the nodes. This can lead to denial of service attacks.
- Most modern operating systems such as Windows and Mac OS contain software to implement peer to peer networks.
- The major differences between client server computing and peer to peer computing are as follows:
    - In client server computing, a server is a central node that services many client nodes. On the other hand, in a peer to peer system, the nodes collectively use their resources and communicate with each other.
    - In client server computing the server is the one that communicates with the other nodes. In peer to peer to computing, all the nodes are equal and share data with each other directly.
    - Client Server computing is believed to be a subcategory of the peer to peer computing.

1.4 WORKING OF CLOUD COMPUTING

From the early days of client/server computing through the evolution of P2P, there has been a desire for multiple users to work simultaneously on the same computer-based project. This type of collaborative computing is being around for more than a decade. Early group collaboration was enabled by the combination of several different P2P technologies. The primary goal is to enable multiple users to collaborate on group projects

online, in real time. To make collaboration on any project, users must be able to talk with one another. This means instant messaging for text-based communication and video capabilities for voice and picture communication.

1.4.1 Cloud Computing: The Next Step in Collaboration

With the growth of the Internet, there was no need to limit group collaboration to a single enterprise's network environment. Users from multiple locations within a corporation, and from multiple organizations, desired to collaborate on projects that crossed company and geographic boundaries. To do this, projects had to be housed in the cloud of the Internet, and accessed from any Internet-enabled location.

1.4.2 Cloud Architecture

Cloud Computing architecture is deceptively simple, although it does require some intelligent management to connect all those computers together and assign task processing to multitudes of users. It architecture comprises of many cloud components, which are loosely coupled. We can broadly divide the cloud architecture into two parts: Each of the ends is connected with Internet. The Fig.1.3 shows the graphical view of cloud computing architecture:

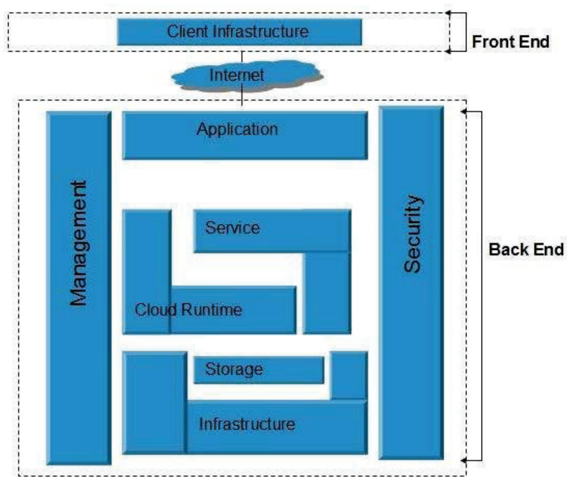


Fig.1.3 Architecture of Cloud

- Front End
    - The front end refers to the client part of cloud computing system. It consists of interfaces and applications that are required to access the cloud computing platforms. A best and well known example is web browser.
- Back End
    - The back End refers to the cloud itself. It consists of all the resources required to provide cloud computing services. It

comprises of huge data storage, virtual machines, security mechanism, services, deployment models and servers, etc.

1.5 CLOUD COMPUTING TODAY

We are currently in the early days of the cloud computing revolution. Although many cloud services are available today, more and more interesting applications are still in development. That said, cloud computing today is attracting the best and biggest companies from across the computing industry, all of whom hope to establish profitable business models based in the cloud.

Most of the developed companies are currently embracing the cloud computing model and services such as:

- Google offers a powerful collection of web-based applications, all served via its cloud architecture. Whether you want cloud-based word processing (Google Docs), presentation software (Google Presentations), e-mails (Gmail), or calendar/scheduling functionality (Google Calendar). Moreover, Google is adept in getting all of its web-based applications to interface with each other; their cloud services are interconnected to the user's benefit.
- Microsoft offers Windows Live suite of web-based applications, as well as the Live Mesh initiative that promises to link together all types of devices, data, and applications in a common cloud-based platform.
- Amazon has its Elastic Compute Cloud (EC2), a web service that provides cloud-based resizable computing capacity for application developers.
- IBM has established a Cloud Computing Centre to deliver cloud services and research to clients.
- And numerous smaller companies have launched their own webbased applications, primarily to exploit the collaborative nature of cloud services.

1.5.1 Why Cloud Computing Matters

There are many implications of cloud technology, for both developers and end users. Some of them are discussed below:-

- Cloud computing provides increased amounts of storage and processing power to run the applications they develop.
- Cloud computing also enables new ways to access information, process and analyze data, and connect people and resources from any location anywhere in the world.
- The cost of buying hardware for storage, or single user licenses for software downloads, is significantly higher than getting the same features through cloud computing.
- A reliable cloud provider will take care of server maintenance and data management, the local IT teams need not worry about it.

- Cloud speeds depend a lot on internet connections and server uptime, but accessing cloud services is generally a lot easier for companies, especially if their local devices might struggle to run that software all on their own. This leads to more efficient work around the office or at home.
- Cloud computing allows more secure services and storage than they would be able to manage on their own.
- Relatively simple to purchase more cloud capabilities as needed, or downside when necessary. This allows businesses to grow with their customer base or update their tech without investing money in new hardware and local systems.

1.6 PROS AND CONS OF CLOUD COMPUTING

Cloud computing can be described as computing that is based entirely on the internet. As in the past, where people needed to run programs or applications from software which would be downloaded from a server or a physical computer, cloud computing services help them to access those applications through the medium of internet.

According to the estimates, 90% of the businesses in the United Kingdom are using a minimum of one cloud service. It is simply because there are several advantages of cloud computing. At the same time cloud computing faces some significant challenges. These are discussed below.

1.6.1 Advantages of Cloud Computing

- **Lower-Cost Computers for Users:** Generally all the applications are runs in the cloud not on the desktop PC. Hence, don't need a high- priced computer to run cloud computing web-based applications.
- **Improved Performance:** In desktop PC impossible to store and run more number of software-based applications due to the fewer computers memory. Computers in a cloud computing system will boot up faster and run faster, because they'll have fewer programs and processes loaded into memory.
- **Lower IT Infrastructure Costs:** Instead of investing in larger numbers of more powerful servers, the IT staff can use the computing power of the cloud to supplement or replace internal computing resources.
- **Fewer Maintenance Issues:** Cloud computing greatly reduces both hardware and software maintenance for organizations. Only less hardware (fewer servers) resources enough and all software are cloud apps so there's no need to have software on the organization's computers.
- **Lower Software Costs:** Instead of purchasing separate software packages for each computer in the organization, only those employees actually using an application need access to that application in the cloud.
- **Instant Software Updates:** Because of the entire app's are web-based, the server suppliers regularly update your software

automatically with latest version without needing to pay for or download an upgrade.

- **Unlimited Storage Capacity:** It is obvious one. The cloud offers limitless storage capacity. At any time you can quickly expand your storage capacity with very nominal monthly fees. A desktop PC or laptop 200GB hard drive is lower compared to the hundreds of petabytes (a million gigabytes) available in the cloud. This means whatever you can store and run on a cloud.
- **Back-up and restore data:** Once the data is stored in a cloud, it is easier to get the back-up and recovery of that, which is otherwise very time taking process on-premise.
- **Reliability:** Reliability is one of the biggest pluses of cloud computing. You can always get instantly updated about the changes.
- **Mobility:** Employees who are working on the premises or at the remote locations can easily access all them could services. All they need is internet connectivity.
- **Improved Compatibility between Operating Systems:** In the cloud, the data matters, not the operating system. Which means imply can connect your Windows computer to the cloud and share documents with computers running Apple's Mac OS, Linux, or UNIX.

1.6.2 Disadvantages of Cloud Computing

- **Requires a Constant Internet Connection:** Good Internet connectivity is a must in cloud computing. You can't access cloud without an internet connection. Moreover, you don't have any other way to gather data from the cloud.
- **Doesn't Work Well with Low-Speed Connections:** Similarly, a low-speed Internet connection is not best and often impossible. Because, Web-based apps often require a lot of bandwidth to download, as do large documents.
- **Lower Bandwidth:** Many cloud storage service providers limit bandwidth usage of their users. So, in case if your organization surpasses the given allowance, the additional charges could be significantly costly.
- **Can Be Slow:** Even on a fast connection, web-based applications can sometimes be slower than accessing a similar software program on your desktop PC. That's because everything about the program, from the interface to the document you're working on, has to be sent back and forth from your computer to the computers in the cloud.
- **Lacks of Support:** Cloud computing companies fail to provide proper support to the customers. Moreover, they want their user to depend on FAQs or online help, which can be a tedious job for non-technical persons.
- **Security Threat in the Cloud:** Another significant drawback is security. Before adopting cloud technology, we should be care on

sensitive information to a third-party cloud computing service provider. Hackers might access this information.

1.7 BENEFITS OF CLOUD COMPUTING

As we discussed in previous section, cloud computing offers many advantages. These are all also may consider benefits of cloud computing system. This section describe that the benefits on business view. It allows you to set up your office and to do your business anywhere at any time. With the growing number of web-enabled devices used in today's business environment (e.g. smart phones, tablets), access to your data is even easier. There are many benefits to moving your business to the cloud while we discussed some of them below:-

1.7.1 Reduced Costs

Moving to cloud computing may reduce the cost of managing and maintaining your IT systems. Rather than purchasing expensive systems and equipment for your business, you can reduce your costs by using the resources of your cloud computing service provider. You may be able to reduce your operating costs because:-

- The cost of system upgrades, new hardware and software may be included in your contract
- No longer need to pay wages for expert staff
- Energy consumption costs may be reduced

1.7.2 Scalability

Purchasing and installing expensive upgrades lead to expensive. This problem solved while the system is connected with cloud. Whereas, the cloud service provider can handle this for you.

1.7.3 Collaboration efficiency

Collaboration in a cloud environment gives ability to communicate and share more easily than the traditional methods. Even though, employees or project across different locations, cloud computing connects employees, contractors and third parties to access to the same files. This collaboration is very essential to improve the companies.

1.7.4 Flexibility

Cloud computing allows employees to be more flexible in their work practices. For example, you have the ability to access data from your remote locations such as home, office or anywhere. Provided, internet connection is only enough to contribute on cloud computing. If you need access to your data while you are off-site, you can connect to your virtual office, quickly and easily.

1.7.5 Automatic Updates

Access to automatic updates for your IT requirements may be included in your service fee. Depending on your cloud computing service provider, your system will regularly be updated with the latest technology. This could include up-to-date versions of software, as well as upgrades to servers and computer processing power.

Check your Progress

1. What is Cloud Computing?
2. What is Server?
3. What is Client?
4. What is dumb terminal?
5. What is distributed computing?
6. Define Client/server system.
7. What do you mean P2P?

1.8 ANSWERS TO CHECK YOUR PROGRESS

1. Cloud is a large group of interconnected computers. These computers can be personal computers or network servers; they can be public or private.
2. All the software applications, all the data, and all the control resided on huge mainframe computers, otherwise known as servers. If a user wanted to access specific data or run a program.
3. Users connected to the server via a computer terminal, sometimes called a workstation or client.
4. A dumb terminal didn't have a lot memory, storage space, or processing power. It was merely a device that connected the user to and enabled him to use the mainframe computer.
5. Distributed computing is a model in which components of a software system are shared among multiple computers to improve efficiency and performance.
6. Client server computing the clients sends request and the server provides the reply for the request received by client.
7. Stands for "Peer to Peer." In a P2P network, the "peers" are computer systems which are connected to each other via the Internet. Files can be shared directly between systems on the network without the need of a central server. In other words, each computer on a P2P network becomes a file server as well as a client.

1.9 SUMMARY

- Cloud computing is powerful. Connecting hundreds or thousands of computers together in a cloud creates a wealth of computing power impossible with a single desktop PC.

- Cloud computing is user-centric. Once you as a user are connected to the cloud, whatever is stored there documents, messages, images, applications.
- All the software applications, all the data, and all the control resided on huge mainframe computers, otherwise known as servers.
- Users connected to the server via a computer terminal, sometimes called a workstation or client.
- P2P computing defines a network architecture in which each computer has equivalent capabilities and responsibilities.
- Client/server network architecture, in which one or more computers are dedicated to serving the others.

1.10 KEYWORDS

The **P2P (peer-to-peer) environment**, every computer is a client and a server; there are no masters and slaves. By recognizing all computers on the network as peers, P2P enables direct exchange of resources and services.

A peer-to-peer (P2P) network is group of computers, each of which acts as a node for sharing files within the group. Instead of having a central server to act as a shared drive, each computer acts as the server for the files stored upon it.

A **client** is a piece of computer hardware or software that accesses a service made available by a server.

A **server** is a computer program or a device that provides functionality for other programs or devices, called clients.

Elastic Compute Cloud (EC2), a web service that provides cloud-based resizable computing capacity for application developers. IBM has established a Cloud Computing Centre to deliver cloud services and research to clients.

ARPANET is a peer-to-peer system that would share computing resources across the United States. The various ARPAnet sites and there weren't many of them were connected together not as clients and servers, but as equals.

1.11 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions:

1. What is Cloud Computing?
2. What is resource sharing?
3. What is Client Server Model?
4. What is Work station?
5. What is Collaborators?

Long Answer Questions:

1. Briefly explain about Pros and Cons of Cloud Computing?
2. Write the benefits of Cloud Computing.

1.12 FURTHER READINGS

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NOTES

UNIT – 2
NON USERS OF CLOUD COMPUTING

Structure

2.0 INTRODUCTION

Cloud computing services can attain a variety of benefits, depending on their particular business needs at a given point in time. The days of large capital investments in software and IT infrastructure are now a thing of the past for any enterprise that chooses to adopt the cloud computing model for procurement of IT services.

The ability to access powerful IT resources on an incremental basis is levelling the playing field for small and medium sized organizations, providing them with the necessary tools and technology to compete in the global marketplace, without the previously requisite investment in on premise IT resources. Clients who subscribe to computing services delivered via the "cloud"• are able to greatly reduce the IT service expenditures for their organizations; and gain access to more agile and flexible enterprise level computing services, in the process.

2.1 OBJECTIVE

After going through the unit you will be able to;

- Understand how to develop the Cloud Services.
- Know about the web applications in Cloud Service.
- Discuss about advantages and disadvantages of cloud service.

2.2 DEVELOPING CLOUD SERVICES

Cloud application development services aim to provide assistance with developing, migrating or otherwise working on applications in order to ensure that they run capably on cloud platforms.

With so many business processes moving to the cloud, more and different types of applications are needed. Vendors offer cloud application development services to assist companies and organizations in developing robust cloud technologies, either by developing brand-new applications or by moving them from legacy systems. As a result, cloud application development services can include services related to consulting, development, migration, integration or testing. Cloud application development service vendors may help determine a choice of cloud platform, for example, private, public or hybrid, or help a client figure out how to move functionality from outdated legacy systems to the cloud.

Cloud application development services are often presented along with certain benefits, such as reducing risk for IT implementation or decreasing time-to-market for applications. Businesses continue to use a variety of cloud application development services in order to "get online" with cloud applications that support their core operations.

Cloud computing approaches are user's perspective, focusing on those web-based applications that owe their existence to the cloud. Cloud computing also offers a lot to software developers, who can now develop web-based applications. Some developed prominent companies including Amazon.com and Google are devoting significant resources to cloud services development tools.

Cloud services, in the form of centralized web-based applications, also appeal to the IT professional. One instance of an application hosted in the cloud is cheaper and easier to manage than individual copies of similar software installed on each user's desktop PC. Upgrading a cloud app only has to be done one time, where upgrading traditional software has to be done for each PC on which that software is installed. Then, of course, we have the promise of cloud-enabled collaboration, which just can't be done with traditional desktop apps.

The advantages of cloud services development are particularly notable to smaller businesses, who otherwise wouldn't have the budget or resources to develop large-scale applications. By hosting locally developed web applications within the cloud, the small business avoids the cost of purchasing expensive hardware to host similar software. Let's face it, most small companies don't have the staff, resources, hardware, or budget to develop and maintain their own applications, or to deal with the rigors of maintaining secure environments.

Although they could outsource their software development and hosting, moving those applications to the cloud, companies don't have to invest in locally hosted systems, freeing up their staff and resources to focus on the day-to-day running of their own businesses.

2.3 PROS AND CONS OF CLOUD SERVICE DEPLOYMENT

Cloud computing is now evolving like never before, with companies of all shapes and sizes adapting to this new technology. Industry experts believe that this trend will only continue to grow and develop even further in the coming few years. While cloud computing is undoubtedly beneficial for mid-size to large companies, it is not without its downsides, especially for smaller businesses.

2.3.1 Advantages

- The main underlying advantage of cloud development is that of economy of scale. Cloud computing vendor, a developer can offer better, cheaper, and more reliable applications than is possible within a single enterprise.
- Instead of purchasing or licensing physical copies of software programs for desktop PC, cloud applications are typically rented per-user basis. It's more of a subscription model because of its investment and a more predictable monthly expense stream.
- All management activities are managed from a central location rather than from individual sites or workstations. This enables IT staff to access applications remotely via the web. When you need more storage space or bandwidth, companies can just add another virtual server from the cloud. It's a lot easier than purchasing, installing, and configuring a new server in their data centre.
- Much easier to upgrade a cloud application than with traditional desktop software. Application features can be quickly and easily updated by upgrading the centralized application, instead of manually upgrading individual applications located on each and every desktop PC in the organization. With a cloud service, a single change affects every user running the application, which greatly reduces the developer's workload.

2.3.2 Disadvantages

Cloud computing has benefited many enterprises by reducing costs and enabling a focus on one's core business competence, rather than IT and infrastructure issues. Despite the general hype on the subject across the IT world, there can be disadvantages to cloud computing, especially in smaller operations. Let's take a look the cons of cloud computing.

- The foremost disadvantage of cloud development is security. Generally, web-based applications have security risks. For this reason, many leading businesses companies prefer to keep their applications, data, and IT operations under their own control.
- There is possible to data loss with cloud-hosted applications and storage. It could even be argued that a large cloud hosting operation is likely to have better data security and redundancy tools than the average enterprise.

- Another important question is what happens if the cloud computing host goes offline. Amazon's EC2 service suffered a massive outage on February 15, 2008, that wiped out some customer application data.
- For clients expecting a safe and secure platform, having that platform go down and your data disappear is a somewhat rude awakening. And, if a company relies on a third-party cloud platform to host all of its data with no other physical backup, that data can be at risk.

Check your Progress

1. What is cloud service?
2. What is web based applications?
3. What is cloud application development?
4. List out advantages and disadvantages of cloud service deployment?

2.4 ANSWERS TO CHECK YOUR PROGRESS

1. Cloud services development is particularly notable to smaller businesses, which otherwise wouldn't have the budget or resources to develop large-scale applications.
2. Web-based applications also appeal to the IT professional. One instance of an application hosted in the cloud is cheaper and easier to manage than individual copies of similar software installed on each user's desktop PC.
3. Cloud application development services aim to provide assistance with developing, migrating or otherwise working on applications in order to ensure that they run capably on cloud platforms.
4. Advantages:
    - Improved Disaster Recovery
    - Increased Collaboration and Flexibility
    - Environmentally Friendly
    - Cost Efficient
    - Almost Unlimited Storage
    - Backup and Recovery
    - Automatic Software Integration
    - Easy Access to Information

   Disadvantages:
    - Internet Connectivity
    - Ongoing Costs
    - Security
    - Technical Issues
    - Prone to Attack

2.5 SUMMARY

- Cloud services, in the form of centralized web-based applications, also appeal to the IT professional. One instance of an application hosted in the cloud is cheaper and easier to manage than individual copies of similar software installed on each user's desktop PC.
- Cloud services development is particularly notable to smaller businesses, which otherwise wouldn't have the budget or resources to develop large-scale applications.
- Cloud applications because all management activities are managed from a central location rather than from individual sites or workstations. This enables IT staff to access applications remotely via the web.
- Application features can be quickly and easily updated by upgrading the centralized application, instead of manually upgrading individual applications located on each and every desktop PC in the organization.

2.6 KEYWORDS

Amazon.com and Google are devoting significant resources to cloud services development tools.

Cost Efficient method to use, maintain and upgrade. Traditional desktop software costs companies a lot in terms of finance. Adding up the licensing fees for multiple users can prove to be very expensive for the establishment concerned.

Security in the Cloud The other major issue while in the cloud is that of security issues. This could potentially put your company at great risk. Hence, you need to make absolutely sure that you choose the most reliable service provider, who will keep your information totally secure.

2.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions:

1. What is Cloud Service?
2. What are the web applications in Cloud?

Long Answer Questions:

1. Explain the advantage and disadvantage of the cloud services.

2.8 FURTHER READINGS

Michael Miller. 2009. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing.

Thomas Erl, Ricardo Puttini and Zaigham Mahmood. 2013. Cloud Computing: Concepts, Technology & Architecture, Prentice Hall Service Technology Series.

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UNIT – 3
TYPES OF CLOUD SERVICE DEVELOPMENT

Structure

3.0 INTRODUCTION

Cloud Computing has evolved greatly over the years since it came into existence in the early 90s. Cloud computing has already started to revolutionize the way we store and access data. We currently see smart phone applications use cloud computing technologies to allow users to store and access date that they previously could not do on a smart device. Cloud's popularity has grown immensely, as more and more recognize its benefits of improving data access, freeing up IT resources for more strategic tasks, cutting and increasing flexibility and efficiency.

3.1 OBJECTIVES

After going through the unit you will be able to;

- Understand types of Cloud Services.
- Know about the Cloud Service development tools.

3.2 TYPES OF CLOUD SERVICE DEVELOPMENT

Cloud computing types are service deployment models which are used to choose the level of control over your information and types of services. There are four main types of cloud computing services are:-

3.2.1 Infrastructure-as-a-Service (IaaS)

The first cloud computing type is infrastructure-as-a-service (IaaS), which is used for Internet-based access to storage and computing power. The most basic category of cloud computing types, IaaS lets you rent IT infrastructure - servers and virtual machines, storage, networks and operating systems - from a cloud provider on a pay-as-you-go basis.

3.2.2 Platform-as-a-Service (PaaS)

The second cloud computing type is platform-as-a-service (PaaS) which gives developers the tools to build and host web applications. PaaS is designed to give users access to the components they require to quickly develop and operate web or mobile applications over the Internet, without worrying about setting up or managing the underlying infrastructure of servers, storage, networks and databases.

3.2.3 Software-as-a-Service (SaaS)

The third cloud computing type is software-as-a-service (SaaS) which is used for web-based applications. SaaS is a method for delivering software applications over the Internet where cloud providers host and manage the software applications making it easier to have the same application on all of your devices at once by accessing it in the cloud.

3.2.4 Functions-as-a-Service (FaaS)

FaaS adds another layer of abstraction to PaaS, so that developers are completely insulated from everything in the stack below their code. Instead of handling the hassles of virtual servers, containers, and application runtimes, they upload narrowly functional blocks of code, and set them to be triggered by a certain event. FaaS applications consume no IaaS resources until an event occurs, reducing pay-per-use fees.

3.3 DISCOVERING CLOUD SERVICES DEVELOPMENT SERVICES AND TOOLS

Cloud computing is at an early stage of its development. This can be seen by observing the large number of small and start-up companies offering cloud development tools. In a more established industry, the smaller players eventually fall by the wayside as larger companies take center stage.

Cloud services development services and tools are offered by a variety of companies, both large and small. The most basic offerings provide cloud-based hosting for applications developed from scratch. The more fully featured offerings include development tools and pre-built applications that developers can use as the building blocks for their own unique web-based applications.

3.3.1 Amazon

- Amazon, one of the largest retailers on the Internet, is also one of the primary providers of cloud development services.
- Amazon has spent a lot of time and money setting up a multitude of servers to service its popular website, and is making those vast hardware resources available for all developers to use.
- The service in question is called the Elastic Compute Cloud, also known as EC2. This is a commercial web service that allows developers and companies to rent capacity on Amazon's proprietary cloud of servers which happens to be one of the biggest server farms in the world.
- EC2 enables scalable deployment of applications by letting customers request a set number of virtual machines, onto which they can load any application of their choice.
- Thus, customers can create, launch, and terminate server instances on demand, creating a truly "elastic" operation. Amazon's service lets customers choose from three sizes of virtual servers:

    - Small, which offers the equivalent of a system with 1.7GB of memory,160GB of storage, and one virtual 32-bit core processor.
    - Large, which offers the equivalent of a system with 7.5GB of memory,850GB of storage, and two 64-bit virtual core processors.
    - Extra large, which offers the equivalent of a system with 15GB of memory,1.7TB of storage, and four virtual 64-bit core processors

3.3.2 Google App Engine

- Google is a leader in web-based applications, so it's not surprising that the company also offers cloud development services.
- These services come in the form of the Google App Engine, which enables developers to build their own web applications utilizing the same infrastructure that powers Google's powerful applications.
- The Google App Engine provides a fully integrated application environment. Using Google's development tools and computing cloud, App Engine applications are easy to build, easy to maintain, and easy to scale.
- All you have to do is develop your application (using Google's APIs and the Python programming language) and upload it to the App Engine cloud; from there, it's ready to serve your users.
- As you might suspect, Google offers a robust cloud development environment. It includes the following features:
    - Dynamic web serving
    - Full support for all common web technologies
    - Persistent storage with queries, sorting, and transactions
    - Automatic scaling and load balancing

NOTES

- o APIs for authenticating users and sending email using Google Accounts
- In addition, Google provides a fully featured local development environment that simulates the Google App Engine on any desktop computer.
- And here's one of the best things about Google's offering: Unlike most other cloud hosting solutions, Google App Engine is completely free to use at a basic level, anyway.
- A free App Engine account gets up to 500MB of storage and enough CPU strength and bandwidth for about 5 million page views a month.
- If you need more storage, power, or capacity, Google intends to offer additional resources (for a charge) in the near future.

3.3.3 IBM Clouds

- It's not surprising, given the company's strength in enterprise-level computer hardware, that IBM is offering a cloud computing solution.
- The company is targeting small- and medium-sized businesses with a suite of cloud-based ondemand services via its Blue Cloud initiative.
- Blue Cloud is a series of cloud computing offerings that enables enterprises to distribute their computing needs across a globally accessible resource grid.
- One such offering is the Express Advantage suite, which includes data backup and recovery, email continuity and archiving, and data security functionality some of the more data-intensive processes handled by a typical IT department.
- To manage its cloud hardware, IBM provides open source workload-scheduling software called Hadoop, which is based on the MapReduce software usedGoogle in its offerings. Also included are PowerVM and Xen virtualization tools,along with IBM's Tivoli data center management software.

3.3.4 Salesforce.com

- Salesforce.com is probably best known for its sales management SaaS, but it's also a leader in cloud computing development.
- The company's cloud computing architecture is dubbed Force.com. The platform as a service is entirely on-demand, running across the Internet.
- Salesforce provides its own Force.com API and developer's toolkit. Pricing is on a per log-in basis. Supplementing Force.com is AppExchange, a directory of web-based applications.
- Developers can use AppExchange applications uploaded by others, share their own applications in the directory, or publish private applications accessible only by authorized companies or clients.
- Many applications in the AppExchange library are free, and others can be purchased or licensed from the original developers.

- Most existing AppExchange applications are sales related—sales analysis tools, email marketing systems, financial analysis apps, and so forth. But companies can use the Force.com platform to develop any type of application.

> **Check your Progress**
>
> 1. What is cloud service?
> 2. What is web based applications?
> 3. List out Amazon Principles.

3.4 ANSWERS TO CHECK YOUR PROGRESS

1. A web service is an application that operates over a network typically, over the Internet. Most typically, a web service is an API that can be accessed over the Internet. The service is then executed on a remote system that hosts the requested services.

2. The Cloud Computing consist four types of cloud services there are,
   - Software as a service
   - Platform as a Service
   - Web Service
   - On-Demand Computing
3. Principles of Amazon are
   - Customer Obsession
   - Ownership
   - Invent and Simplify
   - Hire and Develop the Best
   - Think Big

3.5 SUMMARY

- SaaS requires no upfront investment in servers or software licensing. For the application developer, there is only one application to maintain for multiple clients.
- Each organization served by the vendor is called a tenant, and this type of arrangement is called a multitenant architecture. The vendor’s servers are virtually partitioned so that each organization works with a customized virtual application instance.
- A web service is an application that operates over a network typically, over the Internet. Most typically, a web service is an API that can be accessed over the Internet. The service is then executed on a remote system that hosts the requested services.
- On-demand computing services essentially use these services as offsite virtual servers. Instead of investing in their own physical

infrastructure, a company operates on a pay-as-you-go plan with a cloud services provider.

- Cloud services development services and tools are offered by a variety of companies, both large and small. The most basic offerings provide cloud-based hosting for applications developed from scratch.

3.6 KEYWORDS

- **Software as a service, or SaaS,** is probably the most common type of cloud service development. With SaaS, a single application is delivered to thousands of users from the vendor's servers.

- **Google** is a leader in web-based applications, so it's not surprising that the company also offers cloud development services. These services come in the form of the Google App Engine, which enables developers to build their own web applications utilizing the same infrastructure that powers Google's powerful applications.

- **Salesforce.com** is probably best known for its sales management SaaS, but it's also a leader in cloud computing development.

3.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions:

1. What is Web Service?
2. What is SaaS?
3. Define IBM.

Long Answer Questions:

1. Explain about types of Cloud Services.
2. Briefly explain about Cloud Service development tools.
3. Discuss on Amazon.

3.8 FURTHER READINGS

Michael Miller. 2009. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing.

Thomas Erl, Ricardo Puttini and Zaigham Mahmood. 2013. Cloud Computing: Concepts, Technology & Architecture, Prentice Hall Service Technology Series.

Michael J. Kavis. 2014 Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS), 1st Edition, Kindle Edition, wiley CIO Series

BLOCK – II
CLOUD COMPUTING FOR EVERYONE

UNIT- 4
COLLOBORATING ON GROCERY LIST AND TO-DO LIST

Structure

4.0 INTRODUCTION

Centralized communication involves all stakeholders being connected to a central hub, which stores all the communications in one place, including all the necessary documentation and information. It allows communication to be contextualized into subjects and projects, and can even be broken down into sub-sections so that each conversation is tracked and maintained efficiently, including all relevant documentation and scheduling. Centralized communication removes that barrier. You have access to all

communication, plus all relevant files saved in one easy-to-access area. This offers increased transparency and ensures everyone is on the same page at all times. It is also much easier to ask for advice and help or to spot and deal with potential issues as they arise. As all team members have access to each other's files and communication, errors can be easily dealt with before they become problems.

4.1 OBJECTIVES

After going through the unit you will be able to;

- Understand the Collaborating of Grocery Lists
- Know about the Collaborating on To-Do Lists

4.2 COLLABORATING OF GROCERY LISTS

In some family, both spouses working in companies or industries and might not be able to manually coordinate their grocery lists. For example, spouse might need shampoo but if she didn't tell to her spouse before shopping, he can stop at the grocery and get everything but what his spouse needs.

This problem solved in simple manner by a web-based word processing program to manage your joint grocery lists. Google Docs (docs.google.com) is a web-based word processing program to create a document, and then authorize access for both you and your spouse. Simply, we could open web browser and adding new items with existing list we want to purchase. At the end of the week, when ready to go to the supermarket, connect to the Internet and print out a copy of your grocery list on your home or office printer.Our Groceries and GrocerySmart are providing the best services to purchase our grocery list on cloud. A few apps to make grocery shopping more efficient are dissceued below:

4.2.1 OurGroceries

- This is a super helpful app if you share a grocery list with a spouse. Both people download the app and enter the same email address on the setup screen to access one joint account.
- Click the confirmation email and you're ready to make shared lists. Anyone can make a list or add an item. You can sort your grocery list by item type meat, dairy, etc. and also title each grocery list.
- Say you're both shopping at the same time, you tap the items to cross them off the list and the other person's list is automatically updated in seconds. OurGroceries is available for iOS, Android and Blackberry.
- If there is a downside to this app, it's that it is not very aesthetically pleasing, at least compared to some of the other grocery list apps. But it works well.

4.2.2 BuyMeAPie

- If you search the App Store for "grocery list free" you'll find the lite version of this app. Search "Buy Me a Pie" and you'll find the $2.99 full version of this grocery list app. From Skript, LLC, based in Russia, the lite version of this app offers list making abilities, plus a list organization system, while the fully loaded version adds the ability to sync lists with other iOS devices and send links to various lists via SMS or email.
- All users can create lists using items in the app's dictionary of items. This is somewhat limited, but you can type in your own items, too, and the dictionary will remember those for future reference.

4.2.3 Out Of Milk

- Out of Milk holds your grocery list as well as keeps stock of what's in your pantry you have to enter this information, of course, and keep it up-to-date.
- Listing syncing is free on this app. Users can enter the quantity of each item and organize according to aisles. Pull-up various lists with the top bar popup menu. Available on Google Play.
- Out of Milk allows you to take your grocery list wherever you go no pen or paper required. In addition to allowing users to create a fun, interactive shopping list, you can also create customized to-do lists and even keep an updated home pantry inventory for reference.

4.2.4 Remember the Milk:

- Remember the Milk is a to-do list for everything in your life. From taking out the trash, to buying milk or reminding yourself to buy your best friend a birthday gift.
- Each task is marked as "complete" or "incomplete," so you know what's still on your list. Prioritize lists and send yourself reminders via text message, IM or email.

4.2.5 Grocery IQ:

- This app is that it briefly walks you through how to create lists. You can add items to your grocery list by typing them in, but this app also lets you add items with your voice or by scanning items' barcodes. The scanning recognition works well, and is a fun way to populate your grocery list — just go through your pantry and fridge and scan the barcodes. With the app, users can also access discounts from Coupons.com, which is the parent app of Grocery iQ. Like other grocery apps, you can also sync your lists to your roommates' smartphones. Grocery iQ is available for iOS and Android.

4.2.6 Fooducate:

- It is your hand-held personal nutritionist while in the grocery store. Simply scan a food item in the grocery store, and Fooducate will show you its letter grade in terms of health. Fooducate's grading algoritms were developed with help from dietitians. The app is available on iPhone and Android.

4.2.7 Flipp:

- Users can browse, filter, and find the best deals on weekly grocery essentials by matching local circular deals with coupons from your favorite brands. Reviewers describe Flipp as a paperless coupon master source that makes saving money on groceries easier than ever before.
- Think of Flipp as a hybrid grocery-list shopping app and mobile deal-finder app to save you valuable time and money.

4.2.8 AnyList:

- AnyList makes quick work out of organizing your grocery list by category and translating it into an easily navigable plan of attack. Reviewers particularly love the time-saving Autocomplete feature, which suggests common grocery items as you type them and then intuitively organizes those items into categories.
- In addition to creating organized lists, this grocery list shopping app also lets you easily share those lists with your contacts, select and organize recipes according to your designated meal plan, and sync Siri for a hands-free experience.

4.2.9 Mealime:

- This all-in-one app helps create healthy and personalized weekly meal plans, find recipes based on that meal plan, and organize grocery lists around those recipes. Mealime even includes a built-in tool that shows users the nutritional information of each recipe right down to calories, macros, and micros. With the most personalization options of any minimal-waste meal-planner out there, you can cook exactly how you want to eat, from paleo to vegan to gluten-free.
- One of our favorite features of the app is its clever built-in grocery list function, which creates and optimizes user-friendly grocery lists based on your personalized meal plan. When you build a new meal plan, a grocery list of all the ingredients you'll need for the week is automatically generated.
- As well as making grocery shopping easier, Mealime (download for iOS or Android) helps make your shopping list healthier.
- The app helps you plan meals with more than 200 personalized options such as gluten-free, vegetarian, allergy restrictions, how many people you're feeding and how many meals you need.

- Once you build your meal plan, the ingredients you'll need transfer automatically to your shopping list. You might even get out of the store faster because Mealime includes step-by-step grocery list optimization with standard store layouts.
- The app offers a free and Premium version. Mealime doesn't look like it has a built-in list collaboration feature, but family members could share login information to sync the grocery list.

4.3 COLLABORATING ON TO-DO LISTS

As we just discussed, you and your spouse can collaborate on your to-do list by using a web-based word processing application or web-based planning program. These applications, such as Zoho Planner (planner.zoho.com) let you create multiple to-do lists on the web, which you and your spouse can both add from anywhere at any time.

If these applications are too advanced for your needs, consider using a simpler web-based to-do list application. These applications, such as Remember the Milk (www.rememberthemilk.com) and Ta-da List (www.tadalist.com), operate more like a simple notepad-based list. The Section 7.4.4 and 7.4.5 discuss with Remember the Milk and Ta-da List respectively. However some most popular applications are discussed below:

4.3.1 Wunderlist

- Wunderlist was my best to-do list app of 2017. In a nutshell, Wunderlist lets you create to-do lists you can then share with friends, family, or coworkers -- who will have editing capabilities of their own. And the user experience (UX) doesn't get messy, even when both people are working on a list at the same time.
- When I use Wunderlist to share a grocery list with my roommate, for example, we'll sometimes go to the grocery store together and tackle the list simultaneously. And it's actually fun to check things off and watch her check things off at the same time.
- Finally, it's sleekly designed and very user-friendly. Adding and checking off list items is simple and intuitive, as is adding and checking off sub-tasks, adding a due date, adding any reminders you may want, and so on.

4.3.2 Todoist

- Although Todoist has been around for a while, it's become especially powerful in just the last few years. This tool includes a ton of great features that let you organize tasks by date, color-code them, and so on.
- The free version has fewer features than Wunderlist's free version, but it's very well-designed and user-friendly. You can create sub-tasks and dependencies, projects, and sub-projects. You can attach due dates to these tasks, prioritize them using a color-coding

system, categorize them, and more. The premium account costs $29 per year and includes push notifications, email reminders, labels, and filters.

- Todoist is available for (and looks great on) every major platform: the web, iOS and Android apps, desktop apps for Windows and OSX, add-ons for Firefox and Chrome, plug-ins for email apps like Gmail, Thunderbird, and Outlook, and more.

4.3.3 Trello

- Trello is the online project management tool that our blogging team uses here at HubSpot. It lets you drag, drop, color-code, and manipulate to-do list items in a way that many of the other tools on this list don't.

- You can arrange larger projects into "boards," under which you can add all sorts of lists to break down that bigger project into sub-projects. Under each list, you can add what they call "Cards," which are items in a list. You can add a due date, a checklist, notes, attachments, and color-coded labels to each card. You can also drag and drop cards between lists and boards.

4.3.4 ToodleDo

- ToodleDo is a very user-friendly tool for organizing simple to-do lists on your iOS and Android devices and on the web. It's heavily focused on tasks, and that's what the tool does best. Under each task, you can sub-tasks, additional notes, priority ratings, due dates, and reminders. You can also organize your tasks into different folders.

- While it used to lack some of the aesthetic that other apps (especially Wunderlist) do well, it recently went through a redesign that did wonders for its design. Here's a before and after shot, with the updated version on the right:

4.3.5 Any.do

- Any.do is one of the more beautifully designed apps on this list. It offers all of the features you'd want in a to-do list app, including drag-and-drop and swipe-to-complete, but there are a few things that make it stand out.

- For example, its key differentiator is "the moment" -- a push notification you get each morning telling you to plan your day. There are also a few other cool and delightful features in there, like voice entry and the ability to shake your device to clear finished tasks.

4.3.6 TickTick

- TickTick is a relatively new player, but it has a lot of potential. Like many of the other tools on this list, you can add new tasks, sub-tasks, set deadlines and custom reminders, and share with other users. You can also set recurring to-do list items for every day, a specific number of days, a week, a month, and so on.
- The Pro version has a great calendar view where you can see what your to-do list looks like on a daily or weekly basis and get ahead of the game. You can drag tasks to change the order, and drop tasks into the calendar on the bottom left to set a due date. It also has revision history and an "experimental labs" feature.
- In addition to its mobile apps, TickTick now offers Windows and Mac web apps as well. This to-do tool has a beautiful interface with a solid -- and growing -- feature list. Keep an eye out for updates and check out TickTick plans here.

4.3.7 Google Keep

- Google Keep has existed under the radar for a long time, but it's actually a great tool if you're looking for a place to quickly make and save lists and notes and access them across multiple devices.
- At its core, Google Keep is a simple notepad that connects to Google Drive, where you can keep checklists, photos, voice notes, and other text notes that sync across multiple devices as well as the cloud.

Check your Progress

1. What is web based word processing?
2. Write the uses of To - Do list.
3. What are the main objectives of To-Do list?

4.4 ANSWERS TO CHECK YOUR PROGRESS

1. A web-based word processing program to manage your joint grocery lists. Use a program like Google Docs (docs.google.com) to create a document, and then authorize access for both you and your spouse. Enter the items you need onto the list, one line at a time, and have your spouse do the same.
2. Uses of To-Do List is:
   - Organization
   - Improved Money
   - Productivity
   - Motiviation

3. At their most basic, to-dos contain all of the tasks that you need to complete on a given day. It's a great device for managing time that enables you to lay out everything that you need to accomplish and plan and prioritize your day from there. You can also make to-dos for major tasks like a work assignment or an overall goal. Therefore, the overall purpose of creating a to-do is to remember tasks and create a plan of action to accomplish them.

4.5 SUMMARY

- A web-based word processing program to manage your joint grocery lists. Use a program like Google Docs (docs.google.com) to create a document, and then authorize access for both you and your spouse.
- Enter the items you need onto the list, one line at a time, and have your spouse do the same.
- In these applications are too advanced for your needs, consider using a simpler web-based to-do list application.
- There are many time management software programs available. At a simple level, you can use MSWord or MSExcel to manage your lists. Some versions of Microsoft Outlook, and other email services such as Gmail, have task lists as standard features.
- Remember the Milk is another popular online task management tool that will sync with your smartphone, PDA, or email account. It can even show you where your tasks are on a map. Other similar services include Todoist and Toodledo.
- These applications, such as Remember the Milk (www.rememberthemilk.com) and Ta-da List (www.tadalist.com), operate more like a simple notepad-based list.

4.6 KEYWORDS

- **Zoho Planner (planner.zoho.com)** let you create multiple to-do lists on the web, which you and your spouse can both add to from any computer, at any time.
- **Ta-da List** launched in January of 2005 for the purpose of everyone could have a fast and free to-do list app in their web browser.
- **Remember The Milk** is the popular to-do list that's everywhere you are: from your phone, to the web, to your Google apps, and more.

- **Google Docs** (docs.google.com) is a web-based word processing program to create a document, and then authorize access for both you and your spouse. Simply, we could open web browser and adding new items with existing list we want to purchase.

4.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions:

1. What is web based word processing?
2. Write the uses of To - Do list.
3. List out the demerits of To-Do List. If any?

Long Answer Questions:

1. Explain Collaborating of Grocery Lists.
2. Briefly explain the Collaborating on To-Do Lists.

4.8 FURTHER READINGS

Michael Miller. 2009. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing.

Thomas Erl, Ricardo Puttini and Zaigham Mahmood. 2013. Cloud Computing: Concepts, Technology & Architecture, Prentice Hall Service Technology Series.

Michael J. Kavis. 2014 Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS), 1st Edition, Kindle Edition, wiley CIO Series

UNIT-5 COLLABORATING ON HOUSEHOLD BUDGETS

Structure

5.0 INTRODUCTION

A collaborative budget should prevent the wrong users from accessing data that's not directly related to their roles in the organization. For this reason, a collaborative budget model should have role-based security with an interface that's customized to the user's function. Collaborative budgets need some kind of built-in rigor that protects the financial integrity of the outputs, allowing non-finance team members to enter data without breaking things. In other words, data entered by facilities management is automatically tied to the correct outputs without that user even realizing it.

5.1 OBJECTIVE

After going through the unit you will be able to;

- Understand the Collaborating of Household Budgets.
- Know about the Collaborating on Contact Lists.
- Understand the Communicating across the Community.
- Know about the Collaborating on Schedulers.

5.2 COLLABORATING ON HOUSEHOLD BUDGETS

Web-based spreadsheet program uses to minimize household expenses by creating the budget in it. Google Spreadsheets is a web-based spreadsheet program, in which you can easily create your budget with regular inputs in it from your family members.

Google Spreadsheet can be defined as a Web-based application that allows users to create, update and modify spreadsheets and share the data live online. Google Spreadsheet has the ability to add, delete and sort rows and columns. The application also enables multiple, geographically dispersed users to collaborate on a spreadsheet in real time and chat through a built-in instant messaging program. Users can upload spreadsheets directly from their computers.

To save upcoming expenditure, just switch on your home PC, access the internet, login to the Web-based spreadsheet, and enter that expense. With this facility of Google Spreadsheet creating, updating and editing budgets anywhere anytime has become possible.

5.3 COLLABORATING ON CONTACT LISTS

Contacts are more important. It is difficult to manage hundreds of contacts. Storing and managing contacts through web-based program is called contact management. In which we could store contacts of friends, family members and others. Later on that the stored contact could be retrieved when needed. There are few different ways are for manage the contacts. Some of them are discussed below.

Web-based email program such as Gmail, Yahoo! Mail can be used as essential contact management programs to keep your contacts. Also these web based email programs can save related information about your contacts in your email account. However, the drawback of using such email oriented programs for saving contacts is that every time you or any other family member needs to sign in using the same email program and same email address.

Myevents (www.myevents.com) is another way to store your contacts phone numbers and addresses online and can have access to those via any web browser. In which can also synchronize your calendar, contacts, and tasks from any of your groups to popular programs such as Palm Desktop, Outlook, and Lotus Organizer using Myevents.

5.4 COMMUNICATING ACROSS THE COMMUNITY

Making communication is most essential component across the community as to collaboration. The main and most common objective of cloud computing is to enable easy access to emails in anywhere of the

world at any time. Traditional desktop email, such as Microsoft Outlook or Windows Mail may not be a convenient option than the communication along the cloud.

The better solution when communication on community issues is to use a web-based email program, such as Gmail (mail.google.com), Microsoft Windows Live Hotmail (mail.live.com), or Yahoo! Mail (mail.yahoo.com). These programs can be accessed from any computer connected to the Internet.

You use your web browser to send and view email messages hosted on the web. You can send and receive messages at work, at home, or from wherever you happen to be. Everything you send and receive is stored in the cloud, accessible from anywhere at any time.

Some popular web-based email services, such as Google's Gmail, Yahoo! Mail or Microsoft's Windows Live Hotmail are providing better communication across the society.

- Gmail is the Google approach which is principally developed for email and chat. Practically Gmail is very simple and smart and convenient.
- Windows Live Hotmail is another free email service that gives unlimited storage, fast search, and good security.
- Yahoo! Mail is an ever-present email program on the web. Its free-form labeling and smart folders and a strong spam filter to catch junk effectively make Y! Mail a joy to use.

Some community activists in order to communicate with their community or group members create a unique Web-based email account just for their community communications.

5.5 COLLABORATING ON SCHEDULES

In today's environment, constant access to your schedule is often important. It is important for every individual to maintain a calendar to schedule and plan his/her daily activities.

A web-based calendar can make organizing your life easier. A Web-based calendar, such as Yahoo! Calendar or Google Calendar is accessible to anyone, anywhere, anytime over the Web.

Google Calendar is a free Internet calendar that lets you keep track of your own events and share your calendars with others. It's the ideal tool for managing personal and professional schedules.
It is both simple to use and very powerful. Similar to a traditional day planner, this customizable online organizer keeps track of doctor visits, sports practices, meetings, and social events.

Many web-based calendars are free or low cost and easy to set up. Calendar features can vary from the simple to the complex. Such a calendar can also be arranged in a manner so that your family members can add their own events to this calendar. For instance, when your mother adds her Thursday dinner to the web based calendar, that scheduled event will automatically show on your version of the calendar. It will also appear on the calendars of the other family memberswho can then plan their schedules accordingly. To make this calendar accessible to your other family members, you just need to create a public calendar and authorize access to all the members of your family. Then your family members can see all currently scheduled events and can add new events of their own when they login to the calendar site. To add an event to a Google calendar, you just need to click on a day in month view or an hour in day or week views.

A dialog box points to the day or time and lets you quickly schedule the event. Or you can click on the more details link and add more details. You can also add events from text links on the left. You can also import a whole calendar full of events at once from your Outlook, iCal, or Yahoo! calendar. Google Calendar doesn't sync directly with software like Outlook or iCal, so you'll have to keep importing events if you use both tools.Web-based calendars are beneficial as you can:

- Create appointments, list events, and note tasks.
- Schedule recurring items such as anniversaries, birthdays, and meetings.
- View a day, week, month or year.
- Revise or add notes to calendar entries.
- Create a personal calendar or create a group calendar for club or organization.
- Provide the ability to send yourself reminders via email.
- A way to keep in touch and coordinate with family, friends and associates.
- No dealing with paper unless you decide to print them out.
- You can access your schedule from anywhere
- Your calendar is associated with your email account so no one else can access it without a valid login name and password.

5.5.1 Sports Team Schedules

Web-based calendar tool, such as Google Calendar (calendar.google.com), Yahoo! Calendar (calendar.yahoo.com), or Calendar Hub (www.calendarhub.com) are manage your sports events schedules effectively.

- Google's is well-known and very powerful application is Google Calendar. It is a free online calendar application use to keep track of life's important events like doctor visits, sports practices, meetings, and social events in one place. Actually, it's a tool for managing personal and professional schedules.

- There are several sports team website builder tools for sports teams, specifically for sports schedules, player profiles, box scores, etc. Some popular applications are eteemz (www.eteemz.com), League Athletics (www.leagueathletics.com), LeagueLineup (www.leaguelineup.com), and TeamSnap (www.teamsnap.com).
    - eteamz is a team website design, website hosting, and website builder. From baseball leagues to basketball teams, eteamz is a popular sports website and software provider for teams and leagues.
    - League Athletics have up-to-date sports news about the players, parents and fans.

5.5.2 School Schedules

Web-based calendars are also providing for keeping track of various school schedules and other activities. Google Presentations is one of the obvious web-based presentation programs which encourage online communication between children to prepare and complete their assignments or projects and other presentations on time.

Time management is a significant challenge for every school at the beginning of every academic year. Planning and creating a timetable can be a complex task, as teachers' availability and students' needs must be combined in such a way that ensures a balanced school day schedule for the students. Classter powerful school timetable software is a robust Cloud-based solution for efficient timetable planning and scheduling.

- **Classter:** Classter is a popular web based timetabling solution with Timetable functionality to simplify the overwhelming task of efficient timetable planning and scheduling! Use Classter to enhance the satisfaction of your clients and provide them a unique user experience.
- **Ayotree's:** Ayotree's is an another school management software helps traditional and online schools manage scheduling, attendance, payments and virtual classrooms all in one secure cloud-based system.
- **Thinkwave:** Add students, teachers and classes. Setup enrollment, attendance, schedules, custom grades and custom fields. Invite teachers, students and parents to access their online accounts.

Cloud Based School Management Software provides,

- Save hours compiling report cards and transcripts.
- Includes teacher gradebooks and student & parent access.
- Make your school look great with custom reports and transcripts.
- Cloud-based solution provides security and reliability.
- All-inclusive license with support and upgrades.

5.5.3 Community Group Schedules

Any community group can be benefitted from organizing their activities via a Web-based calendar. All group activities can easily be managed online, in the cloud, using a Web-based calendar.

Check your Progress

1.Write the key components of collaborating community.
2.What is web based Calendar?
3.What is the web based applications in team schedules?
4. Give the various schedules in Collaborating on schedule.
5. What are the typical communication used in cloud computing?
6. What is precloud computing?

5.6 ANSWERS TO CHECK YOUR PROGRESS

1. One of the key components of any community collaboration is communication. This isn't as easy as it sounds, because many community activities are undertaken by people in their spare time outside of normal work and home activities.

2. Web-based calendars are also ideal for keeping track of various school schedules. Whether its homework assignments for a particular class or a school wide events schedule, it's easy for a teacher or school to post that schedule on a web-based calendar.

3. Web-based applications, including eteemz (www.eteemz.com), League Athletics (www.leagueathletics.com), LeagueLineup (www.leaguelineup.com),and TeamSnap (www.teamsnap.com).

4. Various schedules in Collaborating
   - Sports Team Schedules
   - School Schedules
   - Community Group Schedules
   - Event Schedules and Management
5. Communication used in cloud computing
   - Web email services
   - Instant messaging services
   - Web conferencing tools

6. Precloud computing is an email access was via a single computer, which also stores all email messages. Example: Microsoft Outlook or Outlook Express.

5.7 SUMMARY

- Budget collaboration can also be interactive. Perhaps you see a new flat-screen TV in your future, and enter that item into your web-based budget.
- This is easy enough to do when you use a web-based spreadsheet program, such as Google Spreadsheets (part of the Google Docs suite, at docs.google.com), to create your budget.
- A more robust and individualized solution is to use a dedicated web-based contact management program. Some of these programs, such as MyEvents (www.myevents.com) are targeted at home users and ideal for holiday card lists.
- When it comes to coordinating multiple individuals or families in a community activity, you have your work cut out for you.
- Whether it's a youth sports team, community organization, school event, or some community event, trying to line up who's free and who's not on a given evening takes a lot of effort unless, that is, you're using web-based scheduling tools.

5.8 KEYWORDS

- The robust **Customer Resource Management** (CRM) features needed for business and sales force management. Whichever type of program you need to authorize access for both you and your spouse.
- **Google Spreadsheets** is a web-based spreadsheet program, in which you can easily create your budget with regular inputs in it from your family members.
- **My events** is a way to store your contacts phone numbers and addresses online and can have access via any web browser whenever needed.
- A **web-based calendar** tool, such as Google Calendar (calendar.google.com), Yahoo! Calendar (calendar.yahoo.com), or CalendarHub (www.calendarhub.com). Just create a public calendar and provide the URL to all the team members.

5.9 SELF-ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions:

1. What is Collaborating of Household Budgets?
2. Write the Collaborating on Contact Lists.
3. Write the key components of collaborating community.

Long Answer Questions:

1. Briefly explain about the Collaborating on Schedulers.

5.10 FURTHER READINGS

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UNIT-6
COLLABORATING ON GROUP PROJECTS AND EVENTS

Structure

6.0 INTRODUCTION

Collaborative project management is a method used to plan, coordinate, control, and monitor distributed and complex projects. It enables project teams to collaborate across departmental, corporate, and national boundaries and to master growing project complexity. Everybody in the project has access to the information in the project such as tasks, messages, and documents etc. This information is updated in real-time when changes occur. With the advent of Collaborative software more project teams use collaboration tools in their projects. Collaborative project management is based on the principle of actively involving all project members in the planning and control process and of networking those using information, communication, and collaboration modules.

Management is not regarded as an activity reserved solely for managers but as an integral part of the project work of all team members. Collaborative project management makes extensive use of localized control loops. Complex projects are broken down into smaller sub-systems which are then assigned to members of the relevant departments.

Consequently, planning and control responsibility is assumed by those who are also responsible for project content.

6.1 OBJECTIVES

After going through the unit you will be able to;

- Understand the Collaborating on Group Projects and Events.
- Know about the Cloud Computing for Corporation.

6.2 COLLABORATING ON GROUP PROJECTS AND EVENTS

Community groups usually have a lot of tasks to accomplish. In such cases group members depend on each other to accomplish a shared goal or task. In order to carry out all the activities one must know how to get started. In this time of cloud computing, the best way to carry out all the tasks Web-based applications should be used. These applications can be accessed by anyone in the group. A web based application is a software package that can be accessed through the web browser. Web based applications are the ultimate way to take advantage of today's technology to enhance your group's productivity and efficiency in achieving goals. An application that is usable only with an active Internet connection is called a Web-based application. It uses HTTP as its primary communications protocol.

6.2.1 Collaborating on To-Do Lists

Let's start with simple task management, in the form of the old-fashioned todo list. These are web-based lists that multiple group members can access from any web browser. Tasks are entered (complete with due date) and checked off when completed. Some of the more popular online to-do list applications include

- Bla-Bla List (www.blablalist.com)
- Remember the Milk (www.rememberthemilk.com)
- Ta-da List (www.tadalist.com)
- Tudu List (www.tudulist.com)
- Voo2Do (www.voo2do.com)

All of these applications are describe in Section 7.4. These are simple enough for even the most techno-phobic group members to use. Some even let you add new tasks via email or access your lists via mobile phone.

6.2.2 Collaborating on Task Management

Web based task management application is a collection of programs, processes and information that is used to manage various phases of a project and that is accessible on the Internet.

- Basic task management can be accomplished with applications such as HiTask (www.hitask.com) and Zoho Planner (planner.zoho.com). HiTask originated as a friendly and easy-to-use task management system whereas Zoho Planner is an online planner with a calendar, to-do lists, pages, and email reminders for collaboration with other users.
- Basecamp is a web-based project-management tool. It offers to-do lists, wiki-style web-based text documents, milestone management, file sharing, time tracking, and a messaging system. With Basecamp you can create special calendars for vacation time, holidays, meetings, or anything else that isn't specifically tied to a project.
- Goplan is an online project management and collaboration tool for individuals and teams. Goplan manages our projects, communicates with clients and organizes our personal lives.

6.2.3 Collaborating on Event Management

While organizing an event such as conferences or meetings you have to manage the tasks involved with putting together the event. You also handle participant's registration, event marketing and ticket sales, etc. Web-based event management tools have made organizing events much easier without any trouble or disturbances.

A successful event starts well in advance of its opening date. There are tons of details involved in an event of any size, and managing all those tasks takes quite a bit of computing horsepower—just the thing cloud computing can help you out with. Most event management applications include robust task planning modules, similar to what you'd find in higher-end task management applications or lower-end project management apps.

What you want is the ability not just to track individual tasks in a to-do list fashion, but also benefit from sophisticated workflow management. That is, you need to know which tasks need to be completed before later tasks can be started; you need to know who's doing what, and be alerted to any tasks that are unstaffed or understaffed. In other words, you need the planning and workflow management functionality to continue into the event itself, so that you can manage your staff in an efficient and effective manner.

Web-based event management applications provide event planners with a complete solution to increase event attendance and decrease event costs. It enable you to focus your time on strategic decisions rather than repetitive, time consuming tasks. For example, create an online event calendar to inform attendees about all present and future events. Web-based event registration and payment tool such as Eventzilla which is an online event registration and ticketing software for anyone hosting an event, conference and seminar.

6.2.4 Collaborating on Event Marketing

Event marketing is a strategy that links a company to a special event be it sponsorships of a sports competition, or festival, etc. to support corporate objectives. It can define as the activity of designing or developing a themed activity, occasion, and music festival, fair by an organization. It can also define event creation.

When the people want to promote their community related events, they should switch to more innovative forms of marketing. For example, before you conduct an event announcement has to circulate by sending brochure, a leaflet or pamphlet. However your seniors and colleagues want to look at your work before these brochures get distributed. In pre-cloud computing days, this is time consuming task to distribute the brochure to everybody.

Most event management applications deal with basic event marketing. Event marketing can be defined as a Promotional strategy that links a company to a special event be it sponsorships of a sports competition, or festival, etc. to support corporate objectives. It can also be understood as the activity of designing or developing a themed activity, occasion, or exhibit such as a music festival, fair, or concert to promote a product, cause or an organization. It is also called event creation.

When you want to promote your community related events, you want to switch to the more innovative forms of marketing. For example, there is an event that you want to announce. You plan to create a brochure, a leaflet or a pamphlet to announce this event. However your seniors and colleagues want to look at your work before these brochures get distributed. In pre-cloud computing days showing your piece to everybody would have been a tedious and time consuming task. But today with the introduction of Web-based application such as Google Docs you can conveniently create your piece and show it to everyone online for their approvals and appreciation. In this process, however, you must remember to authorize all the members of your organization who you think should view your document and hold the power to make necessary changes to the document.

Web-based local search sites such as Zvents can be used to post announcements of your community events online. Zvents is a popular producer of local entertainment guides online. It has a comprehensive, high-quality storehouse of local event and business information on the web. It helps people to find some interesting things to do in their local area. This in turn helps thousands of event advertisers as it increases attendance at their events. You may even want to use cloud-based social media sites, such as Youtube, Facebook, MySpace etc., to promote your events online by creating and sharing videos, photographs and other audio and visuals. These you can share and circulate to people online. And, after the event, you can post pictures of the event on community photo-sharing Photo sharing sites such as Flickr and Shutter fly. Thanks to cloud computing all this is conveniently possible.

6.3 CLOUD COMPUTING FOR CORPORATION

Companies large and small recognize the cost savings and productivity enhancements of using web-based tools to manage projects collaborate on documents and presentations, manage enterprise wide contacts and schedules, and the like. Cloud computing lets companies do more with limited budgets. With all that in mind, let's look at some of the many ways that companies and their employees can use cloud computing.

6.3.1 Managing Schedules

Salespeople have to deal with lots and lots of contacts. Not only is their address book full, they need to know when to contact certain clients, when follow-up calls are necessary, what the boss needs them to do today, and the like. This is difficult to do from a simple desktop contact management program, such as Microsoft Outlook, which merely acts as a storehouse for names and contact info. It's also difficult to do when you're on the road and need access to all your contacts.

The solution, of course, is a web-based contact management or customer resource management (CRM) application. These programs are tailored to the needs of a busy salesperson and come complete with features such as activity scheduling, appointment reminders, email templates, and the like. Among the most popular of these applications are BigContacts (www.bigcontacts.com), Highrise (www.highrisehq.com), and the marketleading Salesforce.com (www.salesforce.com). Many of these apps include additional functions of use to large sales departments, including expense account management, sales activity reports, and various team management features.

BigContacts:

- BigContacts (www.bigcontacts.com) is a web-based contact manager founded in 2007 by Bob Walton.
- This is one of the most effective and best CRM for small businesses like two people or as large as 2,000.
- BigContacts CRM is now used by thousands of clients across the globe.
- It features an address book, group calendar, task manager, and to-do lists.
- Its CRM functions include sales tracking, activity reports, team management, and mobile access.
- Pricing is on a per-user basis.

Highrise:

- Highrise (www.highrisehq.com) is a very sophisticated contact management application.
- Each contact record can include basic info (name, address, email, and so on), as well as notes, file attachments, images, links to audio and video files, emails, and so on.

Salesforce.com:

- The most popular web-based contact management is offered by Salesforce.com (www.salesforce.com).
- It is customer relationship management solution connects companies and customer together.
- It is one of the integrated CRM platforms for all the departments including marketing, sales, commerce and other services.

6.3.2 Managing Contact Lists

Web-based email program such as Gmail, Yahoo! Mail can be used as essential contact management programs to keep your contacts. Also these web based email programs can save related information about your contacts in your email account. However, the drawback of using such email oriented programs for saving contacts is that every time you or any other family member needs to sign in using the same email program and same email address.

But, perhaps most importantly, what the traditional contact managers actually show is the relative little change it made in the process from analog to digital. In a lot of ways, a contact manager can incorporate new, innovative services to not only help users take a smarter approach to meeting new people but also transmit readily available information from social media profiles directly into that contact profile. That sort of drastic improvement could turn the service from dust-gathering afterthought to a must-use system.

My events (www.myevents.com) is another way to store your contacts phone numbers and addresses online and can have access to those via any web browser. In which can also synchronize your calendar, contacts, and tasks from any of your groups to popular programs such as Palm Desktop, Outlook, and Lotus Organizer using My events.

Here's a breakdown of five applications that are breaking the barriers of the traditional contact managing system on the computer as well as mobile devices.

Plaxo:

- One of the many startup love-children of Napster entrepreneur Sean Parker, Plaxo launched in 2002 as a combination address book/social network. The company had some decent success, partnering with the likes of AOL and Comcast before the latter acquired the startup in 2008.

- Last year, the company did a pivot, dropping its social networking arm in favor of going all-in one contact management. The result is a sophisticated contacts manager that juggles multiple accounts and backs up a comprehensive list of contacts across all platforms.

Evernote Hello:

- Hello rolled out its service for iPhone late last year, and followed up with an updated Android counterpart in late May. It's certainly not the first foray into alternative products that the company has dove into — it achieved moderate success with its acquisitions (Skitch and Penultimate) as well as its own developments (Evernote Food).
- Hello's development was ushered in, according to Evernote CEO Phil Libin, as a response to the traditional, brain-blocking features of an address book. Focused more on meeting new people than sorting out the ones you already have, Evernote Hello is a visual approach to the contact management scene.

Smartr:

- In a calculated rebranding achievement by longstanding contact management startup Xobni, Smartr is a social contact manger available for Gmail and Outlook as well as iPhone, Android and Blackberry.
- Smartr is a variation of Xobni's heavy hitting pro service, which carefully searches through inboxes for conversations and appointments to give a comprehensive look at all interactions with a given contact.
- While the basic service doesn't have the Pro's proprietary cloud backup, it still has plenty of features that Xobni has developed in the last six years.

Tacts:

- Tacts for iPhone is the product of Chinese startup Terntek, and it has broken through internationally with its English language version, which was released in 2010. Although it's not a major player in the contacts service, its steady and reliable platform has enabled Tacts to increase in popularity over time — now it is considered one of the more formidable next-gen contact managers.
- It's important to note that Tacts is a contact manager primarily, but also offers in-app purchases to boost the service's capabilities.
- Tacts has partnered with or by using another meeting service, Bump, to exchange contact information.

Soocial:

- Dutch startup Soocial burst onto the scene in 2006, and quickly gained steam as a popular contact management app for those outside the US. Boasting address unification across 500 different platforms and messaging services, Soocial capitalized on the cloud computing boom to create a universal contacts list. Though it

maintained a small, scrappy team of only 4 workers in Amsterdam, Soocial was getting attention.

- And that attention became an acquisition late last year, when professional networking site Viadeo incorporated the Soocial team into its products. The French social network is the number 1 non-English professional site in the world, but the company is looking to capitalize on Soocial's service within emerging markets. All that aside, Soocial is still up and available for users via online or mobile.

6.3.3 Managing Projects

Most companies at one point or another have at least one big project going On the type of project that involves multiple employees from multiple departments and perhaps multiple locations. Projects of this type have tons of individual pieces and parts, each of which dependent on the completion of a previous task. Keeping track of all the individual tasks—who's doing what and when—can take a gargantuan effort.

That effort is made easier with the use of a web-based project management application. Project members can log in from any location to access the project's master file; they can add or delete tasks, mark tasks as complete, enter detailed billing information for individual tasks, and so forth. And because the project is hosted in the cloud, every team member sees the same Gantt or PERT chart and the same list of tasks, instantly updated when any other member makes an edit.

Many project management applications include additional functions useful in the management of group projects. These features may include group to-do lists, web-based file sharing, message boards, time and cost tracking, and so on. And the most robust of these apps lets you manage multiple projects simultaneously; users can schedule their time across multiple projects and make sure they're not doing two things at once.

Cloud computing is particularly useful to project management. Project management Clouds are available on affordable price, as and when needed, they can impact project management in the following ways:

- Provides opportunities to emerging economies and to small scale enterprises
- Minimizes the gap between small and large enterprises.
- Provides equal opportunities as project management clouds become available at an affordable price

Project management applications such as group to-do lists, web-based file sharing, message boards, time and cost tracking, and so on are valuable in the management of group projects. These apps manage multiple projects simultaneously; users can schedule their time across multiple projects and make sure they are not doing two things at once.

As you might expect, these are not simple applications; they can't be, given the enormity of many enterprise-level projects. Therefore, they're expensive to license and often difficult to learn how to use. The most popular of these apps include AceProject (www.aceproject.com), Basecamp (www.basecamphq.com), Project Insight (www.projectinsight.com). Section 8.3.2 describes with various applications for the project management.

6.3.4 Collaborating on Reports

Collaborating on a web-based document is very easy. Most projects start with the team leader creating a new document online and giving it content and style template. The leader then assigns sections of the report to appropriate individuals, and provides the document URL to each individual. These contributors then work on their own sections of the report, logging into the master document via their web browsers. When all the individual sections are complete, the project leader then looks at the document as a whole, editing for consistency and making sure that all appropriate data is included.

The best Web-based word processors work in conjunction with full-fledged Web-based office suites. Google Docs, for example, encompasses word processing, spreadsheet and presentation functions. Zoho's suite of apps includes similar word processing, spreadsheet and presentation functions as well as a neat little project management module.

6.3.5 Collaborating on Budgets

Traditionally, each department works on its own budget spreadsheet, which is then emailed to the finance department for consolidation with those of other departments. Although that's more efficient than moving sheets of greenbar paper around the office, it's not as efficient as it could be.

Cloud computing offers a better approach. Instead of working on separate spreadsheets that are later consolidated, you can use a web-based application to create a single budget document for all departments on the web. Each department head enters his own budget data. The rolled-up budget is then created in real-time. When the big bosses need to slash certain expenditures, those changes are immediately reflected in the sections or pages for each individual department.

This type of online budgeting can be accomplished with a simple web-based spreadsheet, such as Google Spreadsheets (spreadsheets.google.com) or with a dedicated enterprise-level budgeting application, such as Host Budget (www.hostanalytics.com/budgeting-planning-software.html). In addition,many office management and project management applications include budgeting modules, so that may be an option for your particular firm.

The budgets for collaborative activities will vary greatly depending on the scope of the proposed problem or project and on the number of people

involved. The Foundation recognizes that funding must be appropriate to an activity's specific scope and needs. It also recognizes that organizing and implementing such an activity can be exceedingly time consuming. Unlike Research Award budgets, Collaborative Awards may request administrative support to facilitate the collaborative aspects.

6.3.6 Collaborating on Marketing Materials

Moving over finance, marketing is another area which could immensely benefit from Cloud enabled systems. Putting together a catalogue requires data from several different departments. For example, effective direct mail campaign benefits from marketing, sales, and fulfillment input. Online PR needs participation from marketing, product, and technical staff. Moreover, when it comes to creating marketing materials, usage of web based applications would be the best approach to comfortably collaborate between different departments and would also ensure proper and hassle free management of the supply chain system and personnelinvolved.

The required marketing materials, the cash needed for the same, and the approval or disapproval for the same from the management can all be logged into the same system and can be accessed anytime anywhere, thus reducing the time lag and also eliminating communication gap between various parties involved. The marketing materials themselves can be created using Web-based word processing applications. This puts the draft materials on the web, for everyone on the team (including appropriate senior management) to see, comment on, and even contribute to. After everyone's had his or her say, you can finalize the document and send it to your printer or website.

Check your Progress

1.What is task management?
2.What is event management?
3.What is Scheduling?
4. What is online collaboration in Collaborating on report?

6.4 ANSWERS TO CHECK YOUR PROGRESS

1. Web-based task management application allows you manage the multiple pieces and parts of large projects.

2. Web-based event management applications, the cloud host everything you need to schedule and market your events, as well as handle registration, payment, and other important tasks.

3. Web-based scheduling programs let you schedule both in-person meetings and teleconferences with attendees from multiple locations. You're not limited to just those people located in your

office; you can work with the schedules of people around the country and even in different firms.

4. Online collaboration is one of the chief benefits of cloud computing. Instead of emailing Microsoft Word documents across the company, opt instead for a web-based word processing program, such as Google Docs (docs.google.com) or Zoho Writer (writer.zoho.com). With one of these applications, everyone contributing to the report can access the same master document, online and in real time. When someone from one department adds his section to the document, all the other staffers immediately see the update.

6.5 SUMMARY

- Basic task management can be accomplished with applications such as HiTask (www.hitask.com) and Zoho Planner (planner.zoho.com).
- Web-based event management applications, the cloud host everything you need to schedule and market your events, as well as handle registration, payment, and other important tasks.
- Web-based contact management or Customer Resource Management (CRM) application is tailored to the needs of a busy salesperson and come complete with features such as activity scheduling, appointment reminders, email templates, and the like.
- Online budgeting can be accomplished with a simple web-based spreadsheet, such as Google Spreadsheets (spreadsheets.google.com) or with a dedicated enterprise-level budgeting application,
- Web-based scheduling programs let you schedule both in-person meetings and teleconferences with attendees from multiple locations. You're not limited to just those people located in your office; you can work with the schedules of people around the country and even in different firms.
- Web-based task management application let the user manage the multiple pieces and parts of large projects. With web-based event management applications, the cloud hosts everything the user need to schedule and market events, as well as handle registration, payment, and other important tasks

6.6 KEYWORDS

- **Zoho's** suite of apps includes similar word processing, spreadsheet, and presentation functions as well as a neat little project management module.
- **Web-based calendar** programs schedules meeting or conferences to conduct a sports event, school event and group based community event etc.

- **Web-based email program** such as Gmail, Yahoo! Mail can be used as essential contact management programs to keep your contacts.
- **Web-based event management** handle registration, payment, and other important tasks.

6.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions:

1. What is event marketing?
2. Write short notes on Collaborating on Reports.
3. Define Collaborating on Budgets.

Long Answer Questions:

1. Explain the Collaborating on Group Projects and Events.
2. Briefly explain about the Cloud Computing for Corporation.

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BLOCK-III
CLOUD SERVICES

UNIT-7
EXPLORING ONLINE CALENDAR AND SCHEDULING APPLICATIONS

Structure

7.0 INTRODUCTION

Most computer users today have embraced keeping their schedules on their PCs. Not that the old-fashioned wall-hanging calendar is dead, it's just that it's a whole lot easier to track appointments and events electronically. A web-based calendar service stores your calendars on the Internet, where they can be accessed from any computer that has an Internet connection. This lets you check your schedule when you're on the road, even if your assistant in the office or your spouse at home has added new appointments since you left. Web-based calendars are also extremely easy to share with other users in any location.

7.1 OBJECTIVES

After going through the unit you will be able to;

- Understand the Online Scheduling Applications.
- Know about the Online Planning and Task Management.
- Understand the Collaboration on Event Management.

7.2EXPLORING ONLINE CALENDAR APPLICATIONS

Today's people are eagerly managing their appointments, social events, and to-do lists with online calendars. Maximum numbers of people are already switched to the web-based calendars to save their event and appointments. This calendar service stores your calendars on the Internet and could be accessed from any computer if it has an internet connection.
Web-based calendars are also extremely easy to access and share with other users across the globe, which makes them a great option for collaborative projects and tasks. Therefore, here we discuss few most popular web-based calendars.

7.2.1 Google Calendar

- Google Calendar is a free, full featured, time-management web application offered by Google to keep track of life's important events all in one place.

- It is one of the most well-known web-based calendars today, due to its association with most-used search engine today.

- As you can see in Fig 7., 1Google Calendar lets you create multiple, color-coded calendars. You can set up color-coded calendars and share them as well as invite people to events flexibly using Google calendar.

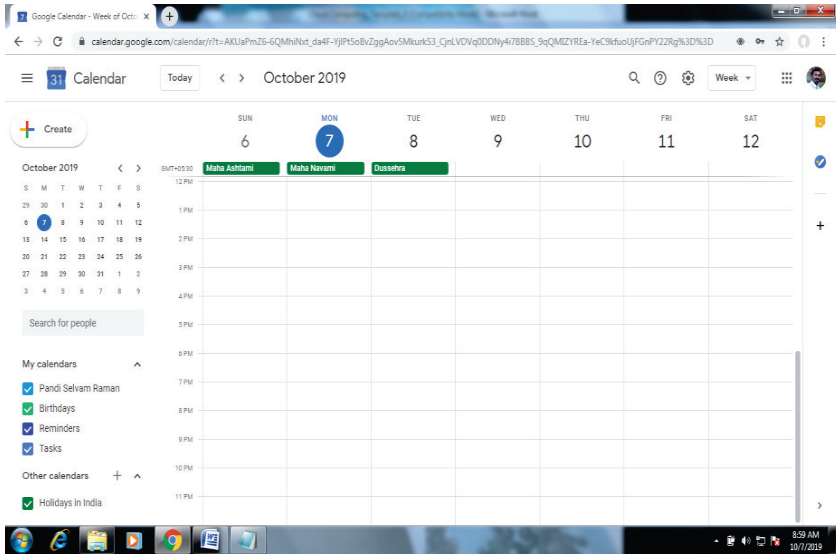


Fig.7.1 Viewing a Google Calendar

- Each calendar can be shared with other Google Calendar users using flexible permissions such as admin, make changes, view only and so on. With this facility you can invite anybody with an email address to your events. These invitees can also make the necessary changes to your event list as and when the need arises.

- It is more valuable for teachers, administrators and students to share schedules, assignment school holidays etc., anyone who needs to view a calendar on web pages or within their own Google Calendar account.

7.2.2 Yahoo! Calendar

- As you can see in Fig.7.2, Yahoo! Calendar is another web-based calendar service from Yahoo!. In which we can feed our events regarding sports, public holidays and others collected from sites. We can also set to dos-priority as urgent, important and normal.
- This Web-based calendar free for anyone to use. User only requirement is Yahoo! ID in order to use the software.
- Yahoo! Calendar allows you to edit and access events on your calendar from anywhere with a browser and Internet access. It offers public and private event scheduling, to-do lists, weather, and integration with Microsoft Outlook.

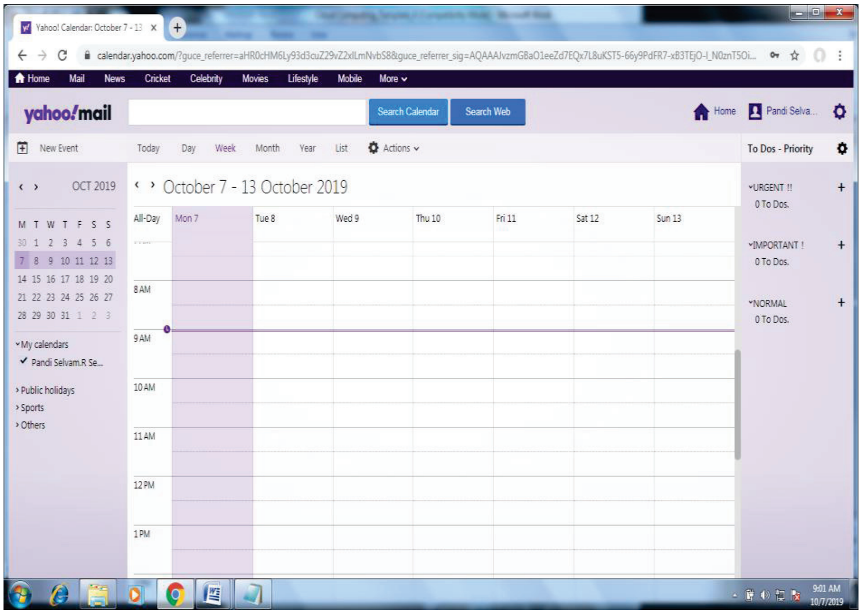


Fig.7.2 Viewing a Yahoo Calendar

- Yahoo! Calendar also has the following features:
- It is a 100 year calendar
- It has various alarm features which allow you to send messages to numerous sources including:
    - email
    - mobile devices
    - Yahoo! Messenger
- It allows sharing of schedules between users. The mechanism allows several different methods of sharing including publicly sharing your calendar, sharing your calendar with a specific Yahoo! Group, and sharing your calendar with a particular Yahoo! user.

7.2.3 Windows Live Calendar

- It is also called Windows Live Hotmail Calendar or Hotmail Calendar.
- It is a time-management web application by Microsoft as part of its Outlook.com service.
- It looks a lot like both of its primary competitors Yahoo! Calendar and Google Calendar.

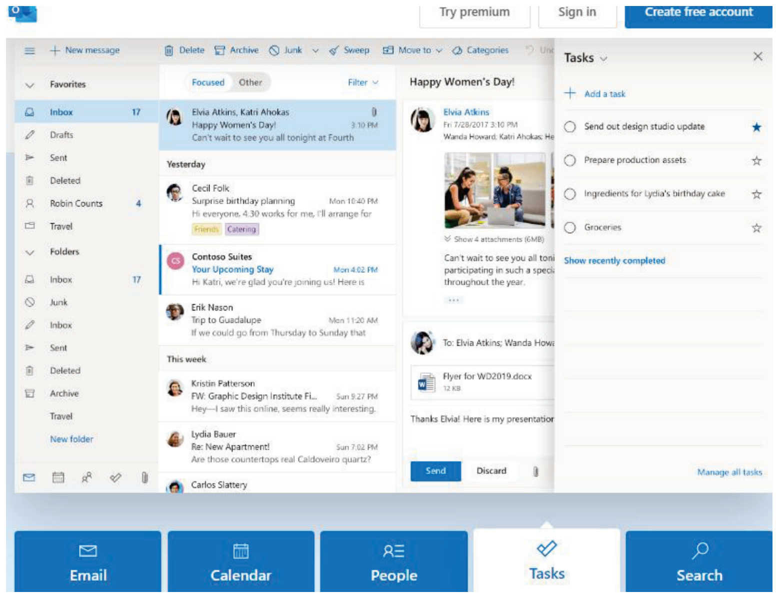


Fig.7.3 Viewing Windows Live Calendar

- Windows Live Calendar supports iCalendar files for users to import calendar entries into their calendars as shown in Fig.7.3.
- It features daily, weekly, monthly and agenda view modes. It also features a to-do list function for users to keep track of their tasks to be completed.
- Calendar events are stored online and can be viewed from any location.

7.2.4 Apple's iCloud Application

- iCloud does store and to access your photos, calendars, contacts, documents and more, from whatever device you're on.
- Also, we can create amazing documents and presentations on Mac, iPhone, iPad and iPod touch.
- Moreover, you can keep up to date across your Mac and all your iOS devices. Your documents with all the latest edits are stored in your apps, so they automatically appear everywhere.
- iCloud is already built into apps like Keynote, Pages and Numbers. It also works with other iCloud-enabled apps.

7.2.5 CalendarHub

- Beyond Google, Yahoo! and Apple many independent sites offer full-featured web-based calendars.
- One of the most popular and free of cost application is CalendarHub (www.calendarhub.com).

- The notable feature of this is can create multiple personal or group calendars.
- In this calendar can also find local events and add them to your calendar, it sends reminders on time by email or on your phone.
- This CalendarHub also offers to invite others to use this application. This firmly provides facility to subscribe to public calendars (e.g. iCal). In addition, CalendarHub lets you publish calendars on your blog or website, which makes it great for creating sites for community groups, sports teams etc.,

7.3 EXPLORING ONLINE SCHEDULING APPLICATIONS

Practically, organizing meetings is complex. A few online applications are eliminate the practical issues of scheduling meetings. Hence, we need switch to web-based Scheduling application to schedule the meeting without any trouble.

This web-based app takes much of the pain out of scheduling meetings, for both large and small groups. The typical app requires all users to enter their individual calendars beforehand. When you schedule a meeting, the app checks attendees' schedules for the first available free time for all. The app then generates automated email messages to inform attendees of the meeting request (and the designated time), followed by automatic confirmation emails when attendees accept the invitation. Professionals who schedule appointments with their clients—doctors, lawyers, hairdressers, and the like—face similar scheduling challenges. For this purpose, separate web-based appointment scheduling applications exist. These apps function similarly to traditional meeting schedulers, but with a focus on customer appointments. A few web-based solutions for meeting scheduling are discussed below.

7.3.1 Jiffle

- Jiffle is a web-based service which primary aims to accelerate the process of scheduling meetings.
- It makes scheduling appointments and meetings speedy and easily.
- Jiffle's allows users to selectively share their Outlook calendar with their contacts and eliminate the time-consuming process required to set up meetings as shown in Fig.7.4 .
- Users mark their convenient times in their Outlook calendar and can share them with selected and invited contacts.
- An automated email is generated to inform the subscriber of the meeting request, and the subscriber's acceptance is followed by an automatic confirmation email to both participants.
- Jiffle offers free up to 10 meeting confirmations per month.

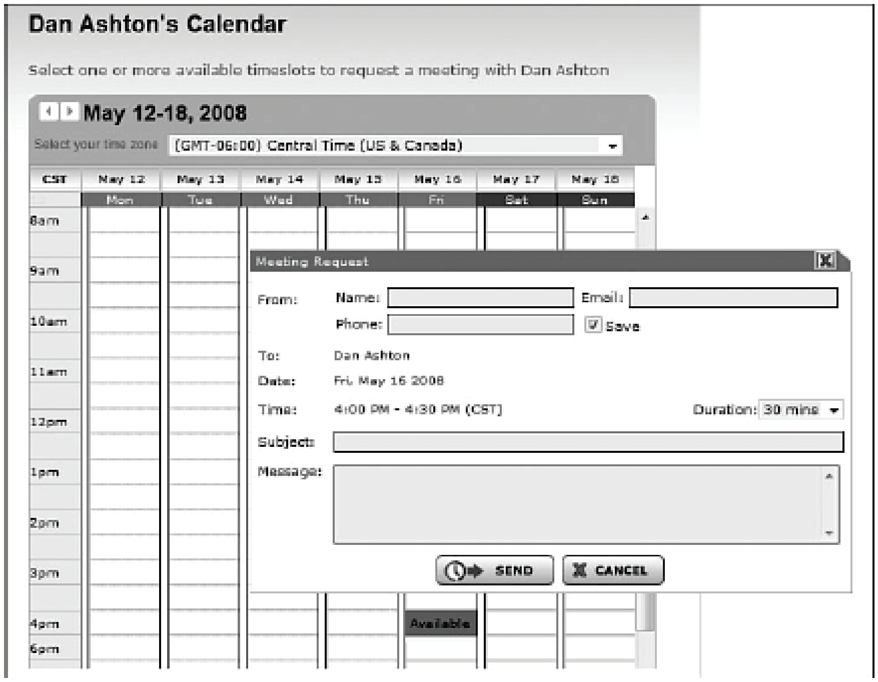


Fig.7.4 Scheduling a meeting with Jiffle

7.3.2 Presdo

- Presdo was created and coded by Eric Ly, the founding chief technology officer of LinkedIn.
- It is the high-engagement event networking app enabling participants to connect through online and mobile apps.
- Unlike Jiffle, Presdo (www.presdo.com) is a scheduling tool that isn’t limited to a single company.
- Presdo lets you schedule meetings and events with anyone who has an email address.
- As you see in Fig 7.5, adding an event is as simple as entering a description into a box.
- Also, provides collaboration, business oppurtuinities with complete event guide facilities.
- Entering the email addresses of other participants, and Presdo emails out the appropriate invites. When an attendee responds, he’s automatically added to the event’s guest list.

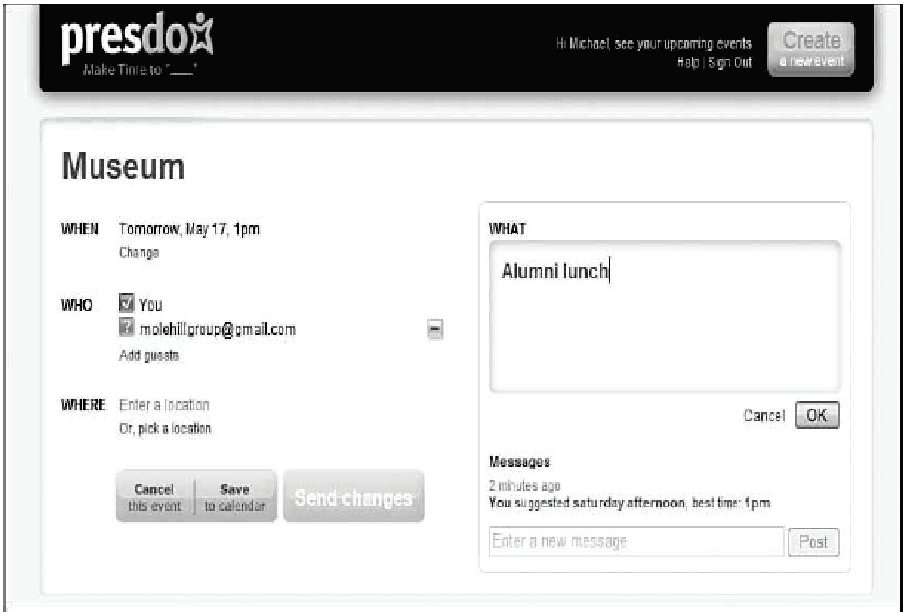


Fig.7.5 Viewing a scheduled Presdo event

7.3.3 Diarised

- Like Presdo, Diarised (www.diarised.com) also a web-based meeting maker that users across different companies can use.
- It helps you pick the best time for a meeting by sending out emails to invitees, letting them choose the best times for them, and then sending you a summary of those best dates.
- You pick the final date, Diarised notifies everyone via email, and your meeting is scheduled.

7.3.4 Schedulebook

- Schedulebook is the faster, smarter, easier choice in online resource and asset scheduling applications.
- Schedulebook offers three different types of Web-based scheduling services such as
    - Schedulebook Professionals - Appointment scheduling is a complex problem for professionals whose livelihood depends on maintaining a busy calendar.
    - Schedulebook Office - Schedule the use of any shared resource, whether part of a business, educational facility, non-profit organization, or even family assets like vacation homes
- Schedulebook Aviation - The perfect solution for schedulingm aircraft, flight training, and other resources in the world of commercial and general aviation.

- Depending on the application, you can use Schedulebook to schedule employees, customers, or other interested parties.
- It is very easy to use and make available all the time on the Web.
- It is the most flexible solution available and is most affordable.

NOTES

7.3.5 Acuity Scheduling

- Acuity Scheduling helps all you need to do is show at right time.
- If a businessman wants scheduling appointments with clients or customers, Acuity Scheduling (www.acuityscheduling.com) can help ease your scheduling operations.
- It is very easy and user friendly.
- To enter into acuityscheduling.com we should login through mail account.
- Acuity Scheduling lets you clients schedule their own appointments 24/7 via a web-based interface like the one in Fig.7.6; you don't have to manually schedule any appointment.

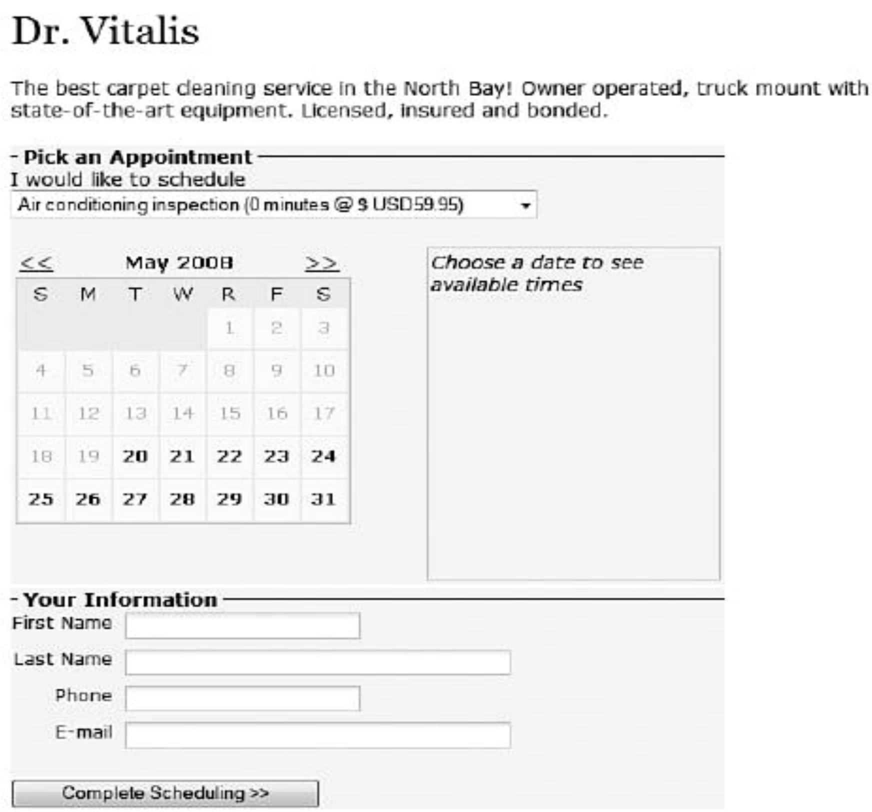


Fig.7.6 A typical client scheduling screen from Acuity Scheduling

7.3.6 AppointmentQuest

- Like Acuity Scheduling, AppointmentQuest (www.appointmentquest.com) is designed to solve the scheduling problems of busy professionals.
- It offers online appointment scheduling software for schools, colleges, hospitals, coaching classes and many other industries for their class scheduling, workshop scheduling, reservations, customer management, online payments, appointments, and event registrations.
- This application not only enables clients to make and you to accept appointments over the web, it also lets you manage personnel, schedules, and other calendar related items.

7.4 EXPLORING ONLINE PLANNING AND TASK MANAGEMENT

Planning and task applications manage everything from simple to-do lists to complex group tasks, all over the Internet. You can additionally collaborate with other users to accomplish your tasks.

7.4.1 iPrioritize

- Sharing to-do lists is important for families, community groups, and businesses. iPrioritize (www.iprioritize.com) is a iPad and iPhone application to share to-do list with others.
- It is a good basic to-do list manager for both simple and complex list of activities. Whatever the application, iPrioritize offers solution efficiently.
- As you can see in Fig.7.7, authorized users can create a new to-do list, add items to the list, prioritize tasks by dragging them up and down the list, and mark items complete when finished.
- Because of its web based, you can access your lists anytime and anyplace. When you have a list, you can print it out, email it to someone else, subscribe to changes in the list and even view lists on your mobile phone which is a great way to consult with others when you are at somewhere.

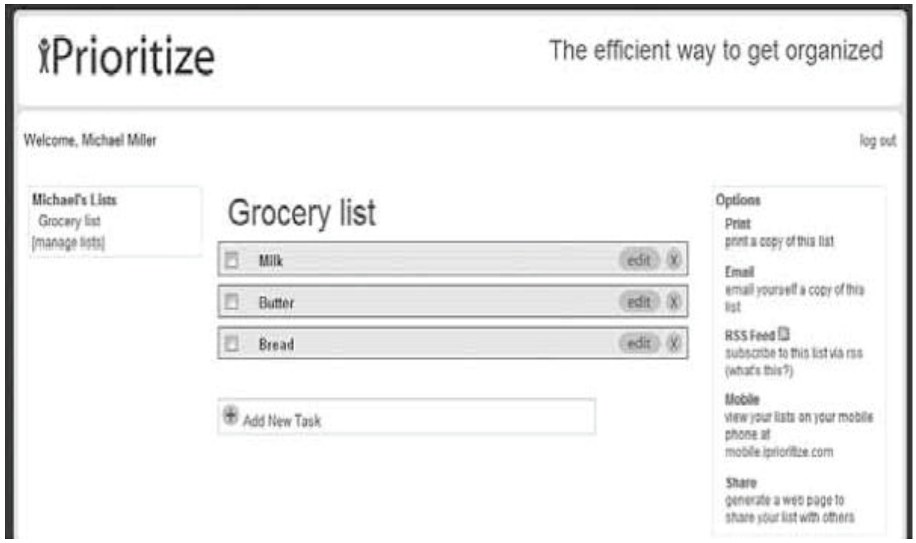


Fig.7.7 A simple web-based to-do list from iPrioritize

7.4.2 Bla-Bla List

- Bla-Bla List (www.blablalist.com) is another simple to-do list manager.
- It's also web based, so you can access your lists from any location at any time.
- You can even publish your lists via RSS (Really Simple Syndication) so that family and coworkers can get instant updates.
- It also helps you to privately share your lists with anyone and work on them together, and it allows you to email yourself a copy of your list.

7.4.3 Hiveminder

- Hiveminder (www.hiveminder.com) is similar to iPrioritize and Bla-Bla List to-do list managers.
- Hiveminder is an online service that starts the way all GTD (Getting Things Done) applications should start, namely with a brain dump.
- Instead of the blank openness of Basecamp or the structure of Tracks, Hiveminder asks you to dump everything you have on your to-do plate into the brain dump screen.

7.4.4 Remember the Milk

- Remember the Milk (www.rememberthemilk.com) is also web-based to-do list manager.

- Remember the Milk is apt for task and time management. It allows users to manage tasks from a computer or smartphone, both online and offline.
- Once you create a list, you can arrange reminders via email, instant messaging, or text messages to your mobile phone.

7.4.5 Ta-da List

- It's another web-based to-do list manager.
- Ta-da List (www.tadalist.com) looks like very traditional approach to to-do tools - create a list of things you need to do and mark off each item as you complete it.
- You can sorts of lists, re-order, edit, delete and can share them them with friends, family, and co-workers.
- Signing up and using Ta-da List are very simple.

7.4.6 Tudu List

- Tudu List (www.tudulist.com) is a free web-based to-do list manager for managing to-do list.
- With Tudu Lists, to do lists can be easily accessed, edited, and shared on the Web. It is a simple but effective project management tool.

7.4.7 TaskThis

- TaskThis is an advanced task management application for iPhone and iPod Touch.
- This is very simple to manage your tasks.
- Mainly developed for organizing projects and categories but also to create and manage shopping lists items.
- TaskThis supports message push notification and is integrated with iPhone/iPod Touch applications.

7.4.8 TracksLife

- Trackslife (www.trackslife.com) is a database-oriented task manager.
- Each "track" is a separate database that combines columns of money, numbers, words, paragraphs, and yes/no responses.
- The application sends out reminders of critical events via email or RSS.

7.5 COLLABORATION ON EVENT MANAGEMENT

Organizing an event is not simple. For example, organizing a conference includes attendee registration, event marketing and ticket sales.

Web-based event management tools have made organizing events much easier and hassle free. With these applications, the cloud hosts everything

you need to schedule and market your events. These applications provide event planners with a complete solution to increase event attendance and decrease event costs.

You can use such applications via notebook PC with Internet connection. Most of these applications also offer task and budget management functions. Popular applications are Cvent (www.cvent.com) and RegOnline (www.regonline.com).

7.5.1 Cvent

- Cvent was founded in 1999 with their goal "to transform meeting and events".
- It one of the leading corporate event planning software offering event management, conference management, meeting management, Onsite solutions etc.,
- Their online event planning software, utilized by a variety of clients, including corporations, associations and third party planners, gives users the ability manage events quickly and affordably.
- Two things are firmly prove their growth.
    - They have customers in more than 100 countries.
    - They have come a long way since 1999.
- Recently, Cvent software plan to finds venues, manage membership data and to create mobile applications.
- Cvent's Event Management system is a suite of interrelated tools, including the following:
    - Event Registration, including online event registration, branded event websites, data collection, and generation of name badges and mailing labels
    - Email Marketing, with automated invitations, "save-the-date"reminders, confirmations, and post-event "thank you" messages
    - Secure Online Payment Processing, which lets you accept payment by all major credit cards—and offer "early-bird" discounts to motivated participants
    - Housing and Travel Management, which provides a one-step process for attendees to sign up, pay, get a hotel room, reserve an airline flight, and receive all relevant follow-up communications
    - Contact Management, which creates a professional directory or address book from all entered participant information
    - Budget Management, which helps you build, track, and analyze budgets for your events
    - Custom Event Websites, which helps you launch a custom website for your event complete with onsite promotion of event sponsors
    - Event Workflow Management, which helps you manage the entire event planning process from start to finish, complete with to-do list emails for event staff

- Event Calendar, a web-based calendar that displays all events open for registration
- On-Site Functionality, which enables you to check in attendees as they arrive onsite, provide self-registration kiosks, print sessionattendee lists, create bar-coded name badges, and process live credit card payments
- Event Reporting, which lets you access event data in real-time via a library of standard and custom reports Cvent's functionality may be even more than that offered by Conference.com; you should definitely compare the two if you need to manage a large or complex event.

7.5.2 RegOnline

- Over two years ago, Cvent acquired RegOnline (with Lanyon Solutions, Inc.), positioning Cvent to deliver world-class event management technology and customer support.
- It's service is similar to Cvent.
- RegOnline incorporate two strong solutions into one comprehensive event management product.
- RegOnline is event management software with solutions for events, meetings and conferences.
- The registration software allows event planners to easily setup online event home pages and registration forms.
- RegOnline handles all payment processing, data tracking and online registration confirmation. They track crucial event data like attendee info in reports that can be viewed, emailed, downloaded or exported from their site.
- Event planners can also create custom reports to track specific event data.

7.5.3 Setdot

- Setdot (www.setdot.com) isn't really for large corporate events; it's more of a stylish web-based way to schedule and manage smaller personal events and activities.
- Setdot lets use choose from various preset themes for your event web page. It even displays maps and directions to events.
- And, although it's mainly for smaller events, it does manage guest responses and messages.

7.5.4 Tendenci

- Another unique approach to event management.
- Tendenci (www.tendenci.com) combines a web-based calendar application with online registration and payment. You create an event calendar,, which you embed in your own website.
- When an interested party clicks an event link, he's taken to a dedicated page for that event, where he can see more information and register online. You can then manage the attendee data, print name tags, and the like.

Check your Progress

1.What is Online Scheduling?
2. What is Task Planning Module?
3.What is Task Management?
4.What is event Management?
5. Define Google calendar.
6. What types of calendars can you create with Google Calendar?
7.Define Yahoo calendar.
8.Define Event Marketing.
9. What are the tools provided by Cvent's Event Management system?

7.6 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Online scheduling is book meetings and other events with friends, colleagues and anyone else via internet.
2. Task Planner module, the administrator can manage the configuration of tasks, or a list of jobs to be executed, by creating and configuring them, defining job class parameters, and configuring scheduling.
3. Task Management let you manage everything from simple to-do lists to complex group tasks, all over the Internet and collaboratively with other users.
4. Event management applications include modules to help you market your event. For example, many apps offer web-based email marketing, which lets you promote your event via targeted email messages. Other apps help you create your own event website (on their cloud computers), which also helps to promote your event.
5. Google Calendar is free, full featured, and easy to use. It lets the user create both personal and shared calendars, which makes it ideal for tracking business group, family, and community schedules
6. Types of calendars can you create with Google Calendar:
   - Personal calendars, like default calendar
   - Public calendars, which others can access via the web
   - Friends' calendars, which is imported from Google Calendar web pages
   - Holiday calendars, which add national holidays to a basic calendar

7. Yahoo! Calendar is the presence of an Add Task button. This reflects Yahoo! Calendar's offering of tasks in addition to events. The user can still add individual items to daily schedule, but can also add longer-term tasks and have due dates show up on calendar.

8. Web-based email marketing enable the user to promote event via targeted email messages. Other applications help to create own event website (on cloud computers), which also helps to promote event.
9. Tools provided by Cvent's Event Management system
    - Event Registration
    - Email Marketing
    - Secure Online Payment Processing
    - Housing and Travel Management
    - Contact Management
    - Budget Management
    - Custom Event Websites
    - Event Workflow Management
    - Event Calendar
    - On-Site Functionality
    - Event Reporting

7.7 SUMMARY

- Scheduling a meeting can be a frustrating experience. Not only do you have to clear time from all the attendees' individual schedules, you also have to make sure that the right-sized meeting room is available at the designated time.
- Our first app is Jiffle (www.jifflenow.com), which schedules meetings, appointments, and the like for the enterprise environment.
- Windows Live Events (home.services.spaces.live.com/events/) is a customized version of its Live Spaces offering; it lets Live Spaces users organize events and share activities between participants.
- The event management software to tie payment processing into the registration process, letting you accept payment via credit card, PayPal, or whatever other payment methods you accept.
- Onsite registration ties into the advance registration and, optionally, the housing management modules of the application.

7.8. KEYWORDS

Google Calendar is a well-known web-based calendar today for calendar services developed by Google.

Yahoo! Calendar allows you to edit and access events on your calendar from anywhere with a browser and Internet access.

iCloud is built into every Apple device. That means all your stuff photos, files, notes and more is safe, up to date and available wherever you are.

Jiffle is a web-based service which primary aims to accelerate the process of scheduling meetings.

TaskThis is an advanced task management application for iPhone and iPod Touch.

RegOnline is event management software with solutions for events, meetings and conferences.

7.9. SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions:

1. What is schedule book?
2. What is Acuity Scheduling?
3. What is Task Management?
4. What is event Management?
5. What is Payment Processing?
6. What is Onsite Registration?

Long Answer Questions:

1. Explain the Online Scheduling Applications.
2. Explain the Online Planning and Task Management.
3. Write short notes on Collaboration on Event Management.

7.10. FURTHER READINGS

Thomas Erl, Ricardo Puttini and Zaigham Mahmood. 2013. Cloud Computing: Concepts, Technology & Architecture, Prentice Hall Service Technology Series.

Michael J. Kavis. 2014. Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS), 1st Edition, Kindle Edition, Wiley CIO Series.

Singh, Jatinder; Powles, Julia; Pasquier, Thomas; Bacon, Jean. 2015. Data Flow Management and Compliance in Cloud Computing. IEEE Cloud Computing.

UNIT – 8 COLLABORATION ON CONTACT AND PROJECT MANAGEMENT

Structure

8.0 INTRODUCTION

Collaborative Project Management is built around the foundation of actively participating and involving all the members of a project in planning and participating, and connects each of them through project management, communication, and collaboration areas and modules. Management of a particular task or activity is not solely assigned to managers, but it is an important part of all the members in that project. Collaborative project management introduces breaking down of the projects in to different smaller parts and given to members of departments that are actively participating in the project. The broken down plans or the sub-plans could be connected between each other and synchronize to participate the different actors in the system so that each member is well aware of the common purpose of the project.

8.1 OBJECTIVE

After going through the unit you will be able to;

- Understand the Contact Management and CRM Applications.
- Know about the Project Management Applications.

8.2 COLLABORATION ON CONTACT MANAGEMENT

Contact management is the act of storing and retrieving information about friends, family, business colleagues and others. Simple computer-based contact management takes the form of an electronic address book, like the Address Book application built in to Microsoft Windows. Applications like

Address Book store this contact information on a single computer, where it can easily be recalled and utilized. Instead of storing personal contacts on your home PC and work contacts on your office computer, you store all your contacts in the cloud, where they can be accessed from both home and work. The main application is to access your contact information from any computer connected to the Internet.

8.2.1 Understanding Contact Management and CRM

Customer relationship management (CRM) is the combination of practices, strategies and technologies that companies use to manage and analyze customer interactions with the goal of improving customer service relationships.
It can also refer as the process of managing the needs, wants, and buying patterns of customers is referred to as customer relationship management.

CRM software not only stores customer contact information, it also stores and analyzes all data relating to a particular customer, and then uses that data to help you determine how best to relate with that customer.

For example, you can use a CRM program to discover which customers order the most from your company or trigger regular phone calls or emails to those customers.

CRM systems are also focuses for marketing track and measure campaigns over multiple channels, such as email, search, social media, telephone and direct mail.

CRMs can be used to create, assign and manage requests made by customers, such as call center software which help direct customers to agents. CRM software can also be used to identify and reward loyal customers over a period of time.

CRM often makes use of social media to build up customer relationship. Some CRM systems integrate social media sites like Twitter, LinkedIn, Facebook and Google Plus to track and communicate with customers sharing opinions and experiences with a company, products and services.

8.2.2 Exploring Contact Management and CRM Applications

Salesforce India's game changing technology and Customer Relationship Management cloud software addresses all your customer interface concerns, from sales and marketing to customer service, streamlining your enterprise and saving invaluable time and resources.

Salesforce delivers state of the art CRM Software-as-a-Service virtually, bestowing your business with all the 21st century speed and efficiency of the cloud computing revolution in India.

CRM custom software from Salesforce instantly updates your business processes, combining them with people and technology to reveal more about your customers and their behavior with deeper analysis and insight into critical sales and customer metrics.

Salesforce.com:

- The most popular web-based contact management is offered by Salesforce.com (www.salesforce.com).
- It is customer relationship management solution connects companies and customer together.
- It is one of the integrated CRM platforms for all the departments including marketing, sales, commerce and other services.
- It offers several different cloud services:
    - Salesforce.com: A software-as-a-service CRM application designed for sales, marketing, customer service, and other uses
    - Force.com: A platform-as-a-service application designed for developers who want to design or customize their own sales force apps
    - AppExchange: An online marketplace of add-on software for Salesforce.com, developed by independent companies.

bConnections:

- Witness bConnections (www.bconnections.com) is a contact management program augmented with essential CRM functions for small and medium-sized businesses.
- The bConnections application starts with a list of companies you do business with, and a list of contacts at those businesses.
- This contact information is hosted on the web and accessible from any Internet-connected computer.
- The application includes a web-based calendar that sales management can use to manage the activities.
- It also tracks leads and sales opportunities, to help you better prepare sales forecasts.
- Fig 8.1 shows a typical contact info entry screen.

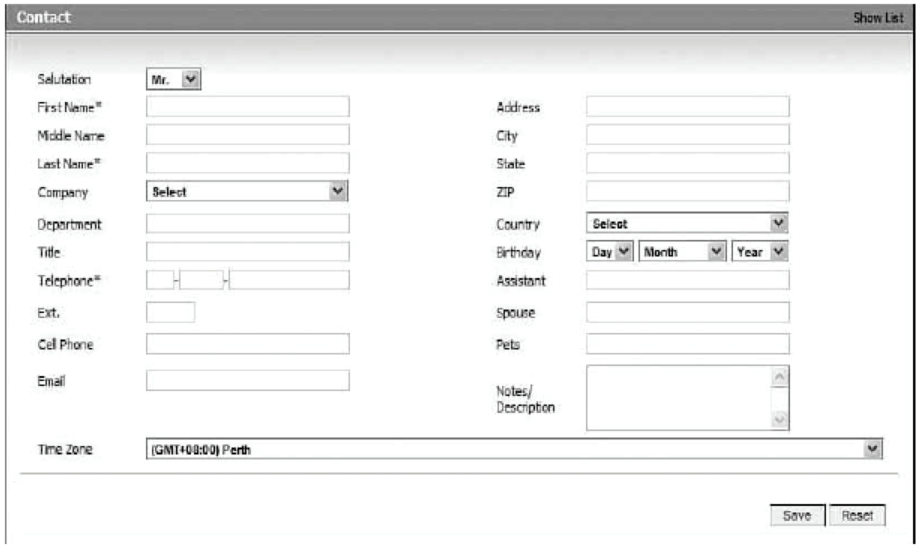


Fig 8.1 Entering contact information in bConnections.

BigContacts:

- BigContacts (www.bigcontacts.com) is a web-based contact manager founded in 2007 by Bob Walton.
- This is one of the most effective and best CRM for small businesses like two people or as large as 2,000.
- BigContacts CRM is now used by thousands of clients across the globe.
- It features an address book, group calendar, task manager, and to-do lists.
- Its CRM functions include sales tracking, activity reports, team management, and mobile access.
- Pricing is on a per-user basis.

MyEvents:

- MyEvents (www.myevents.com) is a combination contact manager, web calendar, task manager, and online community builder.
- It has helped thousands of organizers plan and manage their events through websites.
- Store all your contacts online, where you can access them via any web browser or wireless device.
- Also can get online file storage and sharing, online digital photo albums, hosted web pages, and community bulletin boards and chat rooms.

8.3 COLLABORATION ON PROJECT MANAGEMENT

Managing a large project can be an exhaustive task. Even the smallest project has numerous pieces and parts, all of which have to be completed

in a precise order and on an exacting timetable for the project to come in on time and on budget.

The process of managing a project gets even more complex when the participants are in different locations. Web-based project management application, more easily manage all the pieces and parts, no matter where the players are located. Project is turned into a single database hosted in the cloud, accessible by all from any Internet-connected computer.

8.3.1 Understanding Project Management

- Project management is the act of planning, organizing, and managing resources to bring about the successful completion of specific project objectives.
- To manage the individual tasks within a project requires managing a larger set of resources people, of course, but also money, materials, space, communications, and the like.
- Developing a project has certain set of constraints: Scope, time and cost. These constraints are interrelated; one constraint can't be changed without impacting the others.
- For example, if you increase the scope of a project, you typically need to increase the time and cost. If you want to reduce the time to complete the project, you might need to increase the costs or reduce the scope.

8.3.2 Exploring Project Management Applications

- Traditional project management software helps project managers and team members organize all the various tasks includes scheduling, budget management, and resource-allocation components in a project.
- In web-based project management applications, these are all done online, with a centralized project file accessible to all team members.
- This is enables improved communication and collaboration between members of the project team.
- Some of the most popular web-based project management applications of cloud services are discussed below.

@task:

- AtTask is a browser-based, customizable project management program that can be labeled as a SaaS (software as a service).
- It is therefore easily accessible by anyone with an Internet connection regardless where one is located.
- It offers a variety of traditional projection management functions. The application includesan interactive drag-and-drop Gantt chart (shown in Fig. 8.2) an interactive drag-and-drop, analysis, project milestones, planned/projected/ estimated comparisons, resource

scheduling, issue management, and calendar views for project tasks.

- Tasks can even be managed remotely via a special software widget for Apple's iPhone.

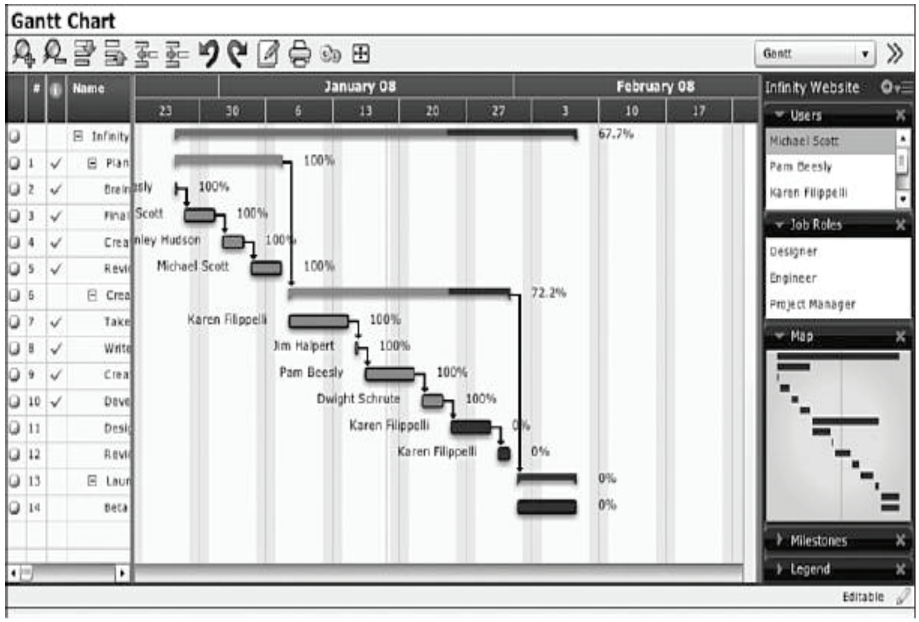


Fig 8.2 The drag-and-drop Gantt chart in @task.

AceProject:

- AceProject (www.aceproject.com) is an easy-to-use web-based project management application.
- This application manages your tasks, documents, and timesheets with functionality.
- It lets users manage multiple projects using multiple resources and share those resources across projects.
- Tasks can be tracked via a variety of filters and the application offers a number of different project reports and statistics.
- AceProject also offers time tracking, email notification of task deadlines, and a monthly project calendar.
- The start and end dates are shown on their individual dates (in green and red, respectively).

Basecamp:

- Basecamp (www.basecamphq.com) is one of the most popular project management applications.
- With Basemcamp we could see exactly what need to done and when.

- In which we can create to-do list, keep the conversation with message boards, projects schedule, space to share documents, files and images.
- It offers file services, task managers, spreadsheets, chats, meetings etc.,

Copper Project:

- Copper Project (www.copperproject.com) is one kind of online management tool developed in 2002.
- It simplicity in project resource management and communication.
- It offers collaborative project and task views, task timers and file sharing to the project team.

eStudio TaskTracker:

- TaskTracker from eStudio (www.same-page.com/online-project-management- 07.html) is an online project management application.
- It's very easy-to-use work on projects, files, schedules and contacts from anywhere, with anytime on any device.
- This program includes features such as task lists (shown in Fig. 8.3), work logs, issue management, automatic task dependencies, subproject capability, budget and expense tracking, Gantt charts, and a full set of management reports.

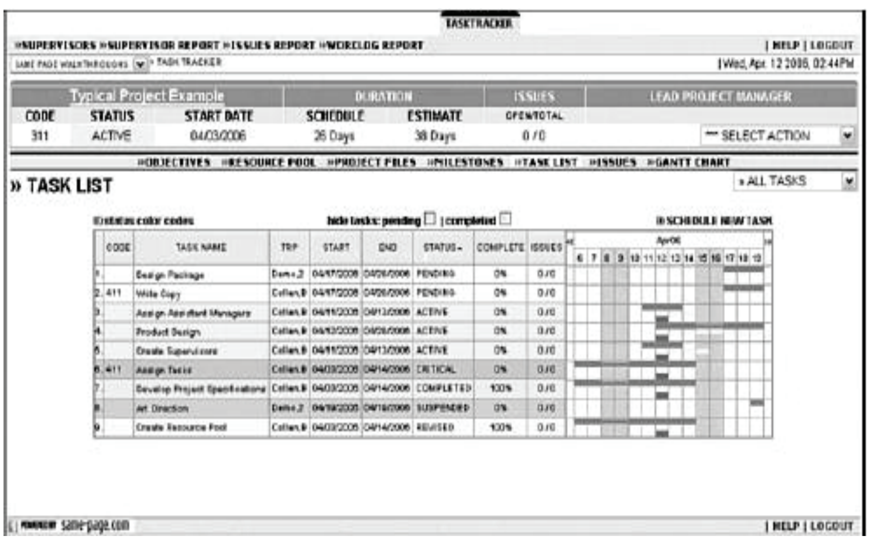


Fig 8.3 An eStudio TaskTracker task list

Project Drive:

- The Project Drive (www.project-drive.net) founded in 1998 by a small group of seasoned developers and graphic designers TGMT Systems Inc, Canada.

- Empowering you to optimize your everyday work needs, web-based solution for your project management needs.
- Collaboration and communication being the key factors in driving any project to success, Project Drive, allows all participants to share ideas from any browser, anywhere in the world and at any time of the day.
- Project Drive offers better control and efficiency, ensuring the successful completion of your projects on time within estimated budget.

Check your Progress

1.What is Conduct Management?
2.What is CRM?
3.What is big conduct?
4.What is project drive?
5. What are the types of calendars in a single interface?
6. What are the modules in the Conference.com?

8.4 ANSWERS TO CHECK YOUR PROGRESS

1. Contact management is the act of storing information about friends, family, and business colleagues for easy retrieval at a later date. We're talking names, street addresses, email addresses, phone numbers, and the like, stored in some sort of computer file.

2. CRM software not only stores customer contact information, it also stores and analyzes all data relating to a particular customer, and then uses that data to help you determine how best to relate with that customer.

3. BigContacts (www.bigcontacts.com) is a web-based contact manager designed for workgroups as small as 2 people or as large as 2,000. It features an address book, group calendar, task manager, and to-do lists.

4. The Project Drive (www.project-drive.net) application includes communication and collaboration features in addition to basic project management functionality. Users get a customizable overview dashboard, templates for fast project setup, Gantt charts, task management, resource allocation, document sharing and management.

5. Member Event calendar helps users manage their personal time, keep track of meetings with others, and so on. Team Event calendar is used to schedule activities for a group, as well as schedule facilities. Supervisor calendar provides reports to managers about business activities and schedules.

6. Modules in the Conference.com
    - Appointment Manager
    - Credit Card Manager
    - Email Manager,
    - Export Manager
    - Hotel Manager
    - Lead Track Manager
    - Profile Manager
    - Registration Manager
    - Survey Manager
    - Travel Manager

8.5 SUMMARY

- Contact management can be more involved and more useful than simple name/address storage. More sophisticated contact management applications help you track all sorts of details about your friends and colleagues, from personal info (birth date, spouse's name, children's names, favorite restaurants, and the like) to business info (employer, department, job responsibilities, and so forth).

- CRM software not only stores customer contact information, it also stores and analyzes all data relating to a particular customer, and then uses that data to help you determine how best to relate with that customer.

- The application includes a web-based calendar that sales management can use to manage the activities of all their reps. It also tracks leads and sales opportunities, to help you better prepare sales forecasts.

- Highrise (www.highrisehq.com) is a very sophisticated contact management application. Each contact record can include basic info (name, address, email, and so on), as well as notes, file attachments, images, links to audio and video files, emails, and so on.

    - Project management is the act of planning, organizing, and managing resources to bring about the successful completion of specific project objectives. The project itself can be anything, from creating a product brochure to implementing a new hiring process to launching a new product line.

8.6 KEYWORDS

Salesforce.com is an American cloud-based software company headquartered in San Francisco, California sells a complementary suite of enterprise applications focused on customer service, marketing automation, analytics and application development.

BigContacts marketing system provides designed especially for small businesses to establish and nurture leads through the sales process. Information is stored in the cloud and accessed through a web-browser.

Web-based project management applications, these are all done online, with a centralized project file accessible to all team members.

AceProject manages your tasks, documents, and timesheets with functionality.

Basecamp is one of the most popular project management applications. With Basemcamp we could see exactly what need to done and when.

TaskTracker online project management application to work on projects, files, schedules and contacts from anywhere, with anytime on any device.

8.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions:

1. What is Conduct Management?
2. What is CRM?
3. What is big conduct?
4. What is project drive?

Long Answer Questions:

1. Explain the Contact Management and CRM Applications.
2. Explain the Project Management Applications

8.8 FURTHER READINGS

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UNIT – 9
COLLABORATION ON WORD PROCESSING AND DATABASES

Structure

9.0 INTRODUCTION

A word processor is a software program capable of creating, storing, and printing documents. Unlike the standard typewriter, users using word processors have the ability of creating a document and making any changes anywhere in the document. This document can also be saved for modification at a later time or to be opened on any other computer using the same word processor. Today, the word processor is one of the most frequently used programs or online services used on a computer.

9.1 OBJECTIVE

After going through the unit you will be able to;

- Understand the Web based word processing works.

- Know about the Web-Based Word Processors.
- Understand the Storing and Sharing Files.
- Understand the Online File storage and sharing services.

9.2 HOW WEB-BASED WORD PROCESSING WORKS

A word processor is software or a device that allows users to create, edit, and print documents. It enables you to write text, store it electronically, display it on a screen, modify it by entering commands and characters from the keyboard, and print it. A word-processing system consists of a personal computer linked to a computer printer to prepare textual documents.

A most common word processor is Microsoft Word. It is a software program that is installed on your computer's hard disk. When the Microsoft Word is hosted in the cloud it switches on web-based word processor. Simply web-based word processing could define that the application is not on your hard drive, it is in the cloud.

9.2.1 Standard Features of Word Processors

All word processors, whether cloud-based or installed on a system, support the following common features:

- insert text: Allows you to insert text anywhere in the document.
- delete text: Allows you to erase characters, words, lines, or pages.
- cut and paste: Allows you to remove (cut) a section of text from one place in a document and insert (paste) it somewhere else.
- copy: Allows you to duplicate a section of text.
- page size and margins: Allows you to define various page sizes and margins, and the word processor will automatically readjust the text so that it fits.
- search and replace: Allows you to direct the word processor to search for a particular word or phrase. You can also direct the word processor to replace one group of characters with another everywhere that the first group appears.
- word wrap: Automatically moves to the next line when you have filled one line with text, and it will readjust text if you change the margins.
- print: Allows you to send a document to a printer to get hard copy.
- file management: Provides file management capabilities that allow you to create, delete, move, and search for files.
- font specifications: Allows you to change fonts within a document. For example, you can specify bold, italics, and underlining. Most word processors also let you change the font size and even the typeface.
- spell checking: Identifies words that don't appear in a standard dictionary.

9.2.2 Advanced features of Word Processors

Modern word processor software additionally supports some advanced features to manipulate and format documents in more sophisticated ways. Some of these are:

- grammar checking: Identifies sentences, paragraphs, and punctuation that doesn't appear to meet commonly recognized rules of grammar.
- footnotes and cross-references: Automates the numbering and placement of footnotes and enables you to easily cross-reference other sections of the document.
- automated lists: Automatically creates bulleted or numbered lists, including multi-level outlines.
- graphics: Allows you to embed illustrations, graphs, and possibly even videos into a document.
- headers, footers, and page numbering: Allows you to specify customized headers and footers that the word processor will put at the top and bottom of every page.
- layout: Allows you to specify different margins within a single document and to specify various methods for indenting paragraphs.
- merge: Allows you to merge text from one file into another file. This is particularly useful for generating many files that have the same format but different data. Generating mailing labels is the classic example of using merges.
- tables of contents and indexes: Allows you to automatically create a table of contents and index based on special codes that you insert in the document.

9.3 EXPLORING WEB-BASED WORD PROCESSORS

There are too many numbers of web-based word processing applications are in market today manipulating the document in effective manner. Few of them are talk about here.

9.3.1 Google Docs

- Google Docs (docs.google.com) is the most popular web-based word processor available today.
- Docs are actually a suite of applications that also includes Google Spreadsheets and Google Presentations and Google Forms.
- The Docs part of the Docs suite is the actual word processing application affords number of editing and styling tools.
- It also supports hundreds of fonts, images and drawings to format your text and paragraphs.

- Access, create, and edit your documents wherever you go from your phone, tablet, or computer even when there's no connection.

9.3.2 Adobe Buzzword

- Adobe Buzzword is a free, Web-based word processor similar to Google Docs.
- It is robust online word processor that allows user to create, edit and stored on text documents online.
- It's a perfect online solution for writing reports, proposals, and anything else you need to access online or work on with others.
- Unlike Google Docs, Buzzword runs in Flash, which might be problematic for users with older PCs or those with slow Internet connections. Full-featured Web browser is necessary for using Adobe Buzzword.
- Buzzword is versatile when working with images. We can import JPG, GIF, and PNG files into any Buzzword document.
- Buzzword flows text around the imported images even better than Word does.
- Files could be easily import and also export to the following file formats – PDF files, Word files, Open documents text files, zipped files, Rich text file formats and plain text files.

9.3.3 ajaxWrite

- ajaxWrite (www.ajaxwrite.com) is a streamlined word processor, comparable to Microsoft Word.
- Can run ajaxWrite from your web browser, it is platform independent and can therefore be used with any operating system.
- Can import and export documents in all popular formats, including documents with graphics.
- Unlike most other web-based word processors, ajaxWrite doesn't work with Internet Explorer. Instead, you have to use the Firefox web browser.

9.3.4 Docly

- Docly (www.docly.com) is an interesting application, designed especially for professional writers.
- Docly allow you to create, edit and share and publish your textual documents online.
- It is professional tool for you where can create an association, publish and share your ideas and also allows earning at the same time.
- It especially offers option of publishing in collaboration with others.
- In Docly, you can participate in discussions within your community, look out for specific information, and engage in e-commerce.

9.4 STORING AND SHARING FILES AND OTHER LINE CONTENT

Cloud storage is defined as the storage of data online in the cloud. Cloud storage can provide the benefits of greater accessibility and reliability; rapid deployment; strong protection for data backup, archival and disaster recovery purposes; and lower overall storage costs as a result of not having to purchase, manage and maintain expensive hardware.

There are many benefits to using cloud storage, however, cloud storage does have the potential for security and compliance concerns that are not associated with traditional storage systems.

9.4.1 Types of Cloud Storage

There are four main types of cloud storage personal, public, private and hybrid.

- **Personal Cloud Storage:** Also known as mobile cloud storage, personal cloud storage is a subset of public cloud storage that applies to storing an individual's data in the cloud and providing the individual with access to the data from anywhere. Apple's iCloud is an example of personal cloud storage.
- **Public Cloud Storage:** Public cloud storage is where the enterprise and storage service provider are separate and there aren't any cloud resources stored in the enterprise's data center. The cloud storage provider fully manages the enterprise's public cloud storage. Amazon S3, Mezeo and Windows Azure are popular examples of public cloud storage.
- **Private Cloud Storage:** A form of cloud storage where the enterprise and cloud storage provider are integrated in the enterprise's data center. In private cloud storage, the storage provider has infrastructure in the enterprise's data center that is typically managed by the storage provider.
- **Hybrid Cloud Storage:** Hybrid cloud storage is a combination of public and private cloud storage where some critical data resides in the enterprise's private cloud while other data is stored and accessible from a public cloud storage provider.

9.4.2 Benefits to Cloud Storage

- **Usability and Accessibility:** Users can easily drag and drop the files in the cloud storage. It is easy to save all the files and data in the cloud, no technical knowledge is required for this purpose. The stored files can be easily accessed from anywhere in the world with just a few clicks and an internet connection.

- **Disaster Recovery:** It is recommended for every business to have a backup plan in case of any emergency. After all, losing important business data can cause huge losses to any business. Cloud storage

is the perfect backup plan for businesses. It creates a backup of the files stored. These files are stored at a remote location and they can be retrieved and accessed at any time.

- **Security:** Business owners can be sure that once the data is stored in the cloud, it is safe. The best thing about using cloud storage is that server data is distributed across redundant servers and the data stored in the cloud is safeguarded against any type of hardware failure. Cloud servers also provide automated backups and snapshots in order to make sure that your data is safe.
- **Cost Savings:** Businesses and organizations can reduce annual operating costs by utilizing cloud storage. Affordability can be ensured if data is stored online in the cloud. Users can ensure additional cost savings because internal power and resources are not required separately for storing the data.
- **Easy Sharing:** Data stored in cloud storage can be easily shared with clients and colleagues in an easy and secure way. You can easily share access to a particular cloud environment or to the complete account with some other user.
- **Collaboration:** Online cloud storage is also an ideal platform for collaboration purposes. A cloud environment enables multiple people to access, edit and collaborate on a single file or document. People can access the cloud environment from anywhere in the world and collaborate in real-time.
- **Scalable Service:** Cloud hosting enables vertical as well as horizontal scaling and the best thing about cloud hosting is that you only pay for the resources that you actually use. You can scale your cloud hosting environment whenever required and you can also define the attributes of scaling the cloud. This ensures more flexibility and a large storage space.
- **Synchronization:** While using local file storage you can only access your data from a certain location. With cloud storage, the daily devices can be your access points like your PC and your smart phone.
- **Convenience:** The amount of convenience and peace of mind offered by cloud storage system is amazing! Even if you store data on transportable devices like external hard drives or flash drives, some kind of manual intervention and physical handling is required. The data that is stored in a cloud is backed up online and it can be accessed from anywhere.

9.5 EVALUATING ONLINE FILE-STORAGE AND SHARING SERVICES

Online data storage also called hosted storage, Internet storage or cloud storage. It refers to storing electronic data with a third party service accessed via the Internet. It is an advancement of traditional local storage (such as disk or tape drives) and portable storage (such as optical media or flash drives). One of the major benefits of online storage is the ability to access data from anywhere.

In recent years, the number of vendors offering online data storage for both consumers and businesses has increased dramatically. Some services store only a particular kind of data, such as photos, music or backup data, while others will allow users to store any type of file. Most of these vendors offer a small amount of storage for free with additional storage capacity available for a fee, usually paid on a monthly or annual basis.

9.5.1 Amazon S3

- The Amazon Simple Storage Service (S3) launched in March 2006 with unlimited online storage.
- It's one of the most popular and well-featured online storage services in today's market.
- It's a high-speed, low-cost web-based cloud storage service designed for online backup and archiving of data and applications.
- It allows to upload, store, and download any type of files up to 5 TB in size.
- All type of industries can use it to store and protect any amount of data for a range of use cases, such as websites, mobile applications, backup and restore, archive, enterprise applications, IoT devices, and big data analytics.
- Amazon S3 provides easy-to-use management features so you can organize your data and configure finely-tuned access controls to meet your specific business, organizational, and compliance requirements.

9.5.2 Egnyte

- Egnyte (www.egnyte.com) is a cloud storage solution with file sharing and collaboration tools for sharing services.
- It provides online secure file storage capability, backup and sharing at hyper-speed.
- You can easily designate authorized users with whom to share specific files and folders, complete with automatic file versioning.

9.5.3 ElephantDrive

- ElephantDrive (www.elephantdrive.com) is a U.S.based cloud backup service providing user-friendly and complete cloud storage solution.
- Its offers secure cloud functionality tightly integrated with leading storage hardware solutions with three different versions of different-sized users: Home Edition, Pro Edition, and Pro plus Edition.
- Each edition has different storage and transfer limits. The Home Edition is priced at an affordable $9.95/month.

9.5.4 Microsoft Office Live Workspace

- Microsoft Office Live Workspace is an online extension of Microsoft Office enabling you to access your documents from anywhere online and to share your work with others.
- Microsoft Office Live is a web-based service providing document sharing and website creation tools for consumers and small businesses.
- Office Live Workspace was a free service for storing and sharing documents online.
- Office Live Workspace service can be used from a PC, kiosk or other Web-access point without Office installed; all you technically need is an Internet Explorer or Firefox browser.

9.5.5 myDataBus

- The myDataBus service (www.mydatabus.com) is a combination cloud storage and file-sharing service.
- You can use myDataBus to store your individual files or to share photos, videos, and music with your friends and family.
- The service also offers group collaboration tools and integration with Facebook, MySpace, LiveJournal, and other similar sites.

9.5.6 Nirvanix

- Nirvanix was an American-based provider of cloud storage services headquartered in San Diego, California, United States.
- The company offered public, hybrid and private cloud storage services with usage-based pricing.
- Nirvanix was founded in 1998 and shut down in 2013.
- Nirvanix is a cloud storage platform optimized for large files and large enterprise-level customers. The Nirvanix Storage Delivery Network intelligently stores, delivers, and processes storage requests in the best network location.
- Storage is offered on an on-demand, completely scalable basis.

Check your Progress

1.How Web-Based Word Processing Works?
2.What is Adobe Buzzword?
3.What is Cloud Service?
4.What is Elephant Drive?
5.What is myDataBus?
6. How Web-Based Word Processing Works?
7.Who should use a Web-Based Word Processor?
8.List the web-based word processing applications.
9.What are the most popular web-based office suites applications?
10.What are the Benefits of Web-Based Spreadsheets?
11. What is Cloud Storage?
12. Why do we use Cloud Storage?
13. What are the risks of storing data in the Cloud?
14. List some of the more popular cloud storage services.

NOTES

9.6 ANSWERS TO CHECK YOUR PROGRESS

1. Web-based word processors are hosted in the cloud, not on your hard drive like independent computer system.

2. Buzzword (buzzword.acrobat.com) is Adobe's entry into the web-based word processor marketplace. Unlike Google Docs, Buzzword runs in Flash, which might be problematic for users with older PCs or those with slow Internet connections. That said, Flash implementation gives Buzzword a snazzy interface and some advanced editing and formatting features.

3. The servers used for cloud storage are typically hosted by third-party companies who operate large data centers. When you subscribe to a cloud storage service, you lease storage capacity from the cloud storage service.

4. ElephantDrive (www.elephantdrive.com) is a user-friendly online file-storage service. They offer three different versions of different-sized users: Home Edition, Pro Edition, and Pro Plus Edition. Each edition has different storage and transfer limits.

5. The myDataBus service (www.mydatabus.com) is a combination cloud storage and file-sharing service. You can use myDataBus to store your individual files or to share photos, videos, and music with your friends and family. The service also offers group collaboration tools and integration with Facebook, MySpace, LiveJournal, and other similar sites.

6. Web-based word processors are hosted in the cloud, not on the hard drive as are the documents created with these applications. And these web-based applications mimic the key features of Microsoft Word.

7. **Users of Web-based word Processor**

    - Beginning users
    - Casual users
    - Anyone who wants access to their documents from multiple locations
    - Anyone who needs to share their documents with others
    - Anyone who needs to edit their documents in a collaborative environment
8. Web-based word processing applications
    - Google Docs
    - Adobe Buzzword
    - ajaxWrite
    - Docly
    - Glide Write
    - iNetWord
    - KBdocs
    - Peepel WebWriter
    - ThinkFree Write
    - WriteBoard
    - Zoho Writer
9. Most popular web-based office suites applications
    - Glide Business (www.glidedigital.com)
    - Google Docs (docs.google.com)
    - Peepel Online Office (www.peepel.com)
    - ThinkFree My Office (www.thinkfree.com)
    - WebEx Web Office (www.weboffice.com)
    - Zoho Office (office.zoho.com)
10. Benefits of Web-Based Spreadsheets
    - The spreadsheets can be accessed from any Internet-connected computer, not just the computer originally created the spreadsheet with.
    - Spreadsheets are still accessible even in the case of computer problem or hard disk crash.
    - The user can share spreadsheets with others enabling workgroup collaboration with users in other locations.
    - In addition, most web-based spreadsheets today are free

11. The first form of web-based data storage is called cloud storage. This is a form of networked data storage where data files are stored on multiple virtual servers. The servers used for cloud storage are typically hosted by third-party companies who operate large data centersThe best-known cloud storage service today is probably Amazon.com's Simple Storage Service (S3).

12. There are three primary benefits to cloud storage:
    - Scalability
    - Reliability
    - Lower costs
13. Risks of storing data in cloud
    - Reliability
    - Security
    - User error
    - Access problems
14. Popular cloud storage services.
    - Amazon S3
    - Egnyte
    - ElephantDrive
    - Microsoft Office Live Workspace
    - Mosso
    - myDataBus
    - Nirvanix
    - steekR
    - Windows Live SkyDrive

9.7 SUMMARY

- Web-based word processors, in contrast, are hosted in the cloud, not on your hard drive as are the documents you create with these applications.
- A web-based word processor is also a good choice if you have modest word processing needs. If all you're doing is writing memos and letters, a web-based application gets the job done with ease.
- Buzzword (buzzword.acrobat.com) is Adobe's entry into the web-based word processor marketplace. Unlike Google Docs, Buzzword runs in Flash, which might be problematic for users with older PCs or those with slow Internet connections.
- AjaxWrite looks a lot like Microsoft Word, which makes it easy to start using the program right away. New documents open in their own windows, complete with Word-like pull-down menus and toolbars.
- The nice thing about Office Live Workspace is that it's free although you do need to own the Microsoft Office suite to create your Office documents, of course. This makes it a great way to store your main or backup copies of your Word, Excel, and PowerPoint documents.

9.8 KEYWORDS

Web-based word processing define that the application is not on your hard drive it is in the cloud.Word processors allow you to do insert, copy, cut, delete, search, print, spell check etc. it the document.

Docly is an interesting application, designed especially for professional writers. What sets Docly apart from other web-based word processors is its focus on copyright management.

Egnyte provides online file storage, backup, and sharing. You can easily designate authorized users with whom to share specific files and folders, complete with automatic file versioning.

Mosso is a business ready cloud hosting platform. Both storage and bandwidth scale automatically as needed; you pay on a per-gigabyte basis for what you actually use.

Nirvanix is a cloud storage platform optimized for large files and large enterprise-level customers.

Cloud Storage types are personal, public, private and hybrid.

9.9 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions:

1. How Web-Based Word Processing Works?
2. What is Adobe Buzzword?
3. What is Cloud Service?
4. What is Elephant Drive?
5. What is myDataBus?
6. What is reliability?
7. What is Security?

Long Answer Questions:

1. Explain Web-Based Word Processing Works.
2. Explain Web-Based Word Processors.
3. Explain Storing and Sharing Files.
4. Explain Online File-Storage and -Sharing Services.

9.10 FURTHER READINGS

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BLOCK-IV
ISSUES IN CLOUD

NOTES

UNIT –10
FEDERATION IN CLOUD

Structure

10.0 INTRODUCTION

In this unit we will learn about federation in cloud. Cloud federation is the concept of bringing different services offered by various providers under a single platform. Federation means to provider. It can help in scaling up. The provider can add additional capacity in the federation world.

10.1 OBJECTIVE

After going this unit we will be able to

- Discuss the concepts of Four Level of Federation in Cloud
- Understand the concept of Privacy in cloud.
- Explain How to Protect Privacy Information in cloud.

10.2 FOUR LEVELS OF FEDERATION

Cloud federation(also called federated cloud) defines the practice of interconnecting the cloud computing environments of two or more service providers. It also defines that software, infrastructure and platform services from disparate networks that can be accessed by a client via the internet.

The federation of cloud resources is making easy through network gateways that connect public or external clouds, private or internal clouds and/or community clouds. Cloud federation manages strength and access controls when two or more independent geographically different clouds share their files, computing resources or to use storage resources. Cloud federation offers some substantial benefits to cloud providers.

- The federation of cloud resources allows clients to optimize enterprise IT service delivery.
- The federation of cloud resources allows a client to choose the best cloud services provider, in terms of flexibility, cost and availability of services, to meet a particular business or technological need within their organization.
- Federation across different cloud resource pools allows applications to run in the most appropriate infrastructure environments.
- The federation of cloud resources also allows an enterprise to distribute workloads around the globe, move data between disparate networks and implement innovative security models for user access to cloud resources.

The great potential of CC manifests itself through the offer of a wide range of services as summarized by the following three approaches.

- Infrastructure-as-a-Service (IaaS) – basic computing resources (i.e. CPUs, RAM memory, storage, networking) are offered by a provider as virtual instances.
- Platform-as-a-Service (PaaS) – a complete computing platform is offered as an application middleware.
- Software-as-a-Service (SaaS) – the cloud provider installs and operates application softwares and databases accessible by and customised over the needs of the end-user.

The Cloud Federation platform achieves this goal by means of an architectural model based on three basic building blocks schematically shown in Fig.10.1.

- A Frontend component, representing the entry point to the entire platform.
- A Resource Broker, the very heart of the platform, consisting of Billing and Metering modules supporting an Orchestrator Engine module which dynamically matches the user requirements with the available resources.
- A Cloud Interface which represents the end-point connection to the federated resources.

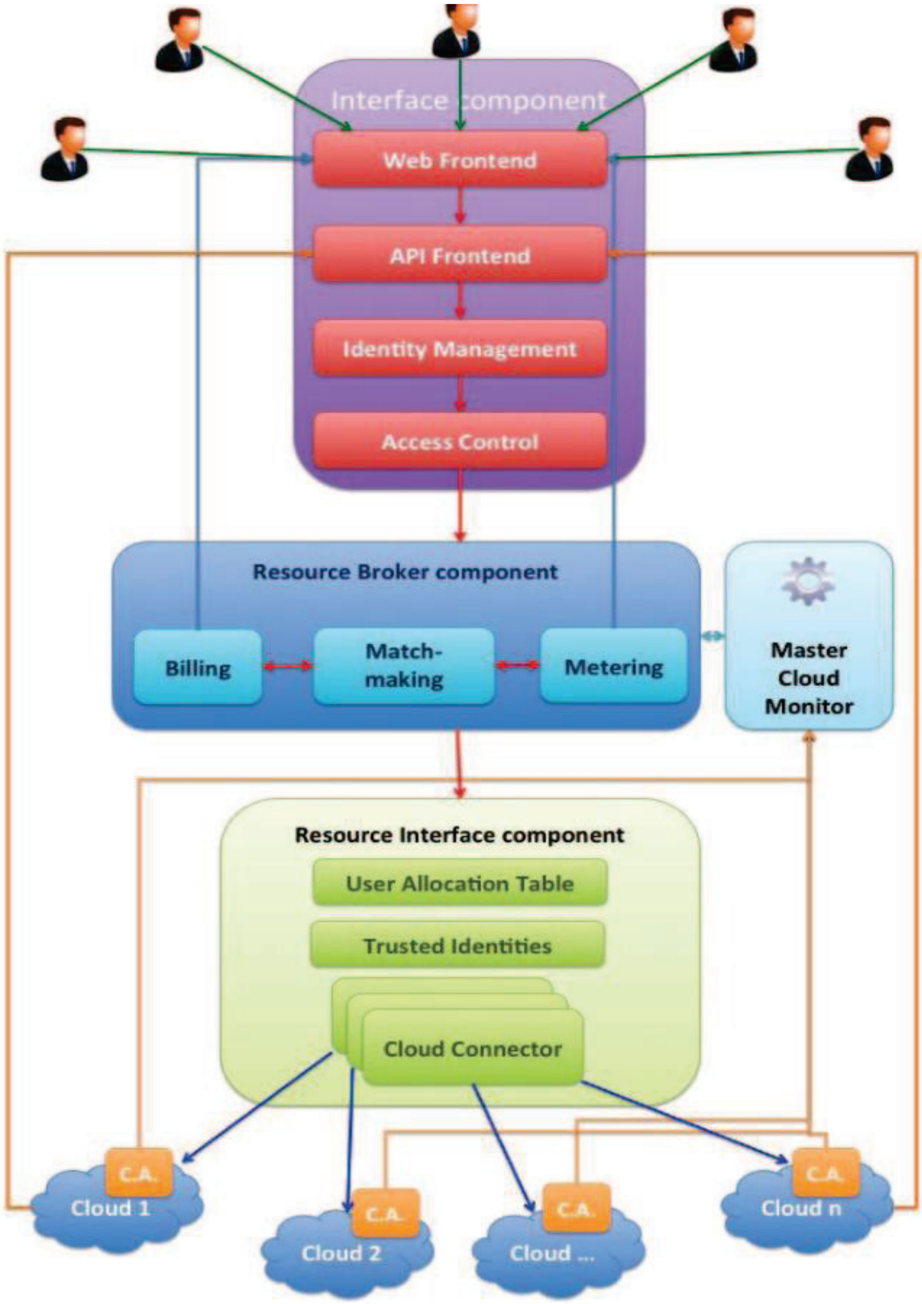


Fig.10.1 Cloud Federation architecture

10.2.1 Permissive federation

- Permissive federation occurs when the server accepts a connection from a peer network servers without verifying its identy using DNS look as are certificate checking.

- The lack of verification are authentication may let to domain schooling that is the unauthorized use of third party domain name in an e-mail messaage in order to pertent to be someone else.

- With the release of the open source jabberd 1.2 server in October 2000, which incorporated support for the Server Dialback protocol (fully supported in Jabber Xen Cloud Platform (XCP)), permissive federation met its termination on the Extensible Messaging and Presence Protocol(XMPP) network.

10.2.2 Verified federation

- This type of federation happens when a server accepts a connection from a peer after the identity of the peer has been verified.
- It uses information obtained via DNS and by means of domain-specific keys exchanged in advance.
- The connection is not encrypted, and the use of identity verification effectively prevents domain spoofing.
- To make this work, federation requires proper DNS setup, and that is still subject to DNS poisoning attacks. Verified federation has been the default service policy on the open XMPP since the release of the open-source jabberd 1.2 server.

10.2.3 Encrypted federation

- In this mode, a server accepts a connection from a peer if and only if the peer supports Transport Layer Security (TLS) as defined for XMPP in Request for Comments (RFC) 3920.
- The peer must present a digital certificate. The certificate may be self-signed, but this prevents using mutual authentication. If this is the case, both parties continue to weakly verify identity using Server Dialback.
- Server Dialback uses the DNS as the basis for verifying identity; the basic approach is that when a receiving server receives a server-to-server connection request from an originating server, it does not accept the request until it has verified a key with an authoritative server for the domain asserted by the originating server.

10.2.4Trusted federation

- In this mode, a server accepts a connection from a peer only under the condition that the peer supports TLS and the peer can present a digital certificate issued by a root Certification Authority (CA) that is trusted by the authenticating server.

- The list of trusted root CAs may be determined by one or more factors, such as the operating system, XMPP server software, or local service policy.

- In trusted federation, the use of digital certificates results not only in a channel encryption but also in strong authentication.

10.3 PRIVACY IN CLOUD

Cloud computing provides various advantages like data storage, data management, CRM management, resource optimization (cost, time and investment) etc. At the same time it has raised a major challenge i.e data security and privacy.

Privacy refers confidentiality of information. Every individual has the right to control his or her own data, whether private, public or professional. Privacy concerns are increasingly important in the online world. The process of securing personal data into the cloud has huge challenge for all stakeholders, involving pressures both legal and commercial.

Cloud computing has important implications for the privacy of personal, business and governmental information. Any information stored locally on a computer can be stored in a cloud, including email, word processing documents, spreadsheets, videos, health records, photographs, tax or other financial information, business plans, PowerPoint presentations, accounting information, advertising campaigns, sales numbers, appointment calendars, address books, and more.

The whole contents of a user's storage device may be stored with a single cloud provider or with many cloud providers. Whenever an individual, a business, a government agency, or other entity shares information in the cloud, privacy or confidentiality questions may arise. Protecting data privacy is attaining major challenges. Some of these are discussed below:

- **Data Replication:** Everybody faces this challenge. Snapshots and data backups are taken on a daily basis. They automatically stored in the cloud. It is not somewhat difficult to identify where they have been stored and who can see and access them.

- **Data Loss:** Data loss is a major challenge for any business. Data can be easily lost or exposed as it moves between one clouds to other. We don't have the authority to block any user who is violating data policies.

- **New Class of Users:** Cloud computing need cooperation between security, storage, application, and security administrations. They all manage your sensitive data. With more number of users, the risk also increases. If one admin misbehave entire data in the system will be at risk.

- **Insecure APIs:** Application Programming Interfaces (API) allows users to customize their cloud computing practices. APIs can be a threat to cloud security because of their nature. APIs give developers the tools to build solutions to integrate their applications with other software. The vulnerability of an API depends on the communication that takes place between applications. While this can help developers and businesses, they also issue serious security concerns.

- **Internal Threat:** This is one of the biggest challenge faces by all groups of people who are all in the cloud. You may be thinking data is safe inside. But, Employees can use their access to an organisation's cloud-based services to misuse or access information related to finance, customer details etc.

Check your Progress

1. What is cloud Federation?
2. List out federation types.
3. What is Permissive federation?
4. What is Encrypted federation**?**
5. What do you mean privacy?
6. What are privacy risk in cloud?

10.4 ANSWERS TO CHECK YOUR PROGRESS

1. Cloud federation is the concept of bringing different services offered by various providers under a single platform.

2. There are four basic types of federation:

    - Permissive
    - Verified
    - Encrpted
    - Trusted

3. Permissive federation happens when a server accepts a connection from a peer network server without verifying its identity using DNS lookups or certificate checking.

4. Encrypted federation, a server accepts a connection from a peer if and only if the peer supports Transport Layer Security (TLS) as

defined for XMPP in Request for Comments (RFC) 3920. The peer must present a digital certificate.

5. Privacy can define restriction on searching for or revealing facts that are unknown or unknowable to others.
6. Any information store locally on a computer can be store in a cloud including e-mail word processing documents,spreadsheets,videos,health records,tax or other financial information business plans,power point presentation,accounting,information advertising compigns sales,numbers,appoinment calenders address,books and mode.

10.5 SUMMARY

- Cloud federation manages strength and access controls when two or more independent geographically different Clouds share either substantiation, files, computing resources, command and handle or right to use to storage resources.
- The Internet term, often referred as the "network of networks," Inter Cloud represents a "Cloud of Clouds" and therefore expresses the same concept of federating together clouds that fit in to distinct administrative organizations.
- Permissive federation happens when a server accepts a connection from a peer network server without verifying its identity using DNS lookups or certificate checking.
- In this mode, a server accepts a connection from a peer if and only if the peer supports Transport Layer Security (TLS) as defined for XMPP in Request for Comments (RFC) 3920. The peer must present a digital certificate.
- One of the best ways to protect our data while using cloud storage is to do data encryption.

10.6 KEYWORDS

- **Inter Cloud** represents a Cloud of Clouds.
- **Privacy** refers confidentiality of information.
- **Password** is very important to change the password frequently and never use the same password for all the accounts or folders.
- **Internal Threat** is one of the biggest challenge faces by all groups of people who are all in the cloud.
- **Federal Trade Commision(FTC)** is educatting consumers and businesses about the importance of personal information privacy include the security of personal information under the FTC act the commission guards against and unfarmous and deseption by enforcing companies about how they collect use and secure consumers personal information.

10.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions:

1. How will you Protecting Privacy Information?
2. Explain about verified federation and trusted federation.

Long Answer Questions:

1. Write about four different levels of cloud federation.
2. Explain about privacy in cloud.

10.8 FURTHER READINGS

Arshdeep Bahga and Vijay Madisetti. 2014. Cloud Computing: A Hands-On Approach Hardcover. Publisher-Vijay Madisetti.

Dan C. Marinescu. 2013. Cloud Computing: Theory and Practice Paperback.MK Publications.

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UNIT – 11
SECURITY IN CLOUD

Structure

11.0 INTRODUCTION

Cloud security, also called cloud computing security is the protection of data, applications, and infrastructures involved in cloud computing. Many aspects of security for cloud environments (whether it's a public, private, or hybrid cloud) are the same as for any on-premise IT architecture. Cloud computing security is a fast-growing service that provides many of the same functionalities as traditional IT security.

11.1 OBJECTIVES

After going this unit we will be able to

- Discuss the concepts of Software as a service.
- Understand the concept of Case Study in Aneka.
- Explain about Service Level Agreement.

11.2 SECURITY-AS-A-SERVICE (SAAS OR SECAAS)

Security-as-a-service (SaaS) is an outsourcing cloud computing model that delivers managed security services over the internet. The simplest example of security as a Service involves is using anti-virus software delivered over the Internet. Unlike traditional approach, security as a service allows you to use the same tools using only a web browser, making it direct and affordable.

11.2.1 Benefits of Security-as-a-Service

There are a lot of advantages to using a security as a service offering. These include:

- **Save on costs:** Need not to buy hardware or pay for software licenses. Instead, you can replace the operating expenses, usually at a discounted rate compared to the upfront costs.
- **Ease of management:** A service provider delivers total management of cloud security services, security policies, and general administration. Therefore you need not bother regarding security services and polices.
- **Faster provisioning:** The beauty of security as-a-service offerings is that you can give your users access to these tools instantly.
- **Continuous anti-virus updates:** SecaaS services ensure that security software is maintained with the most current virus definition and security updates.
- **Simpler Management:** If you have protected data, it is not enough to just keep it secure. You should know when a user accesses this data when he or she does not have any legitimate business reason to access it.
- **Security collaboration:** IT security experts are at your beck and call, and they may have more experience and a better skill set than anybody on your IT team.
- **Continuous monitoring:** Tools that allow you to manage risks continually by monitoring the security processes that are in place.
- **Data loss prevention:** Tools that protect, monitor, and verify the security of all of your data, whether they are in storage or in use.
- **Email security:** Protects your business from phishing, spam, and malicious attachments.
- **Encryption:** Makes your data unreadable unless it is decoded using the right numerical and cryptographic ciphers.

11.2.2 Security-as-a-Service Providers

Security-as-a-service providers charge a monthly subscription fee to reduce cost burden for outsourced services. But instead of providing access to a tool or platform, they provide protection for your apps, data, and operations that run in the cloud. In Table 11.1 categorized the markets with vendors/providers who are most popular today.

Table 11.1 Markets category with popular vendor/provider

Category	Popular vendor/provider
CLOUD ACCESS SECURITY BROKERAGE	Palerra
SINGLE SIGN-ON	Okta
EMAIL SECURITY	Proofpoint
WEBSITE AND APP SECURITY	White Hat Security
NETWORK SECURITY	Qualys

- **Palerra:** Palerra founded in 2013. Although a younger company, Palerra has already tens of millions of dollars in funding from several A-list investors. Their product was the first on the market to automate the entire security lifecycle, from preventative measures to detection and remediation.

- **Okta:** Okta's single sign-on solution uses Security Assertion Markup Language (SAML) to validate log-in credentials and let users securely access any application with a single username and password. Okta provides strong central administrative features, so IT managers can set custom policies and report on usage, as needed. They also offer one of the broadest integration networks in the industry.

- **Proofpoint:** Proofpoint is one of the top cloud security providers that focuses on email. Their solution is designed to secure and control outbound and inbound email threats in any kind of environment, from small businesses running on Gmail, to complex, hybrid Sharepoint environments at large enterprises.

- **White Hat Security:** White Hat Security has significant experiences identifying and remediating web and application threats. Their current products use dynamic and static application security testing to make sure your websites and source code stay secure. White Hat also offers a solution for mobile application security, which applies the same analytics and testing capabilities to any mobile apps your organization deploys.

- **Qualys:** Qualys network security tools monitor your assets (servers, computers, devices) and continuously discover them, identifying new vulnerabilities and helping you patch them immediately. You can also track devices in your local office or remote cloud environments and receive alerts about suspicious activity.

11.3 CASE STUDY: ANEKA

Aneka is a market oriented cloud development and management platform with rapid application development and workload distribution capabilities. The main aim of Aneka is to support open-ended set of abstractions and features for distributed computing and deployment scenarios. It is a Manjrasoft's solution for developing deployment and managing cloud applications. It is a platform and a framework for developing distributed applications on the Cloud.

Aneka is an integrated middleware package which allows you to seamlessly build and manage an interconnected network in addition to accelerating development, deployment and management of distributed applications using Microsoft .NET frameworks on these networks. It is

market oriented since it allows you to build, schedule, provision and monitor results using pricing, accounting services in private and/or public (leased) network environments.

Aneka is a workload distribution and management platform that accelerates applications in Microsoft .NET framework environments. Some of the key advantages of Aneka over other GRID or Cluster based workload distribution solutions include:

- Rapid deployment tools and framework
- Ability to harness multiple virtual and/or physical machines for accelerating application result
- Support of multiple programming and application environments
- Simultaneous support of multiple run-time environments
- Built on-top of Microsoft .NET framework, with support for Linux environments through Mono

Aneka includes a Software Development Kit (SDK) which includes a combination of APIs and Tools to enable you to express your application. Aneka also allows you to build different run-time environments and build new applications. Aneka provides APIs and tools that enable applications to be virtualized over a heterogeneous network.

Supported APIs include:

- Task Model for batch and legacy applications
- Thread Model for applications that use object oriented thread
- MapReduce Model for data intensive applications like data mining or analytics.
- Others such as MPI (Message Passing) and Actors (Distributive Active Objects/Agents) can be customized

Supported Tools include:

- Design Explorer for Parameter Sweep applications. Built on-top of task model with no additional requirements for programming.
- Work Flow applications. Built on-top of task model with some additional requirements for programming.

Build different types of Run-time environments:

- PC Grids (also called Enterprise Grids)
- Data Centres (Clusters)
- MultiCore Computers
- Public and/or private networks
- Virtual Machine or Physical

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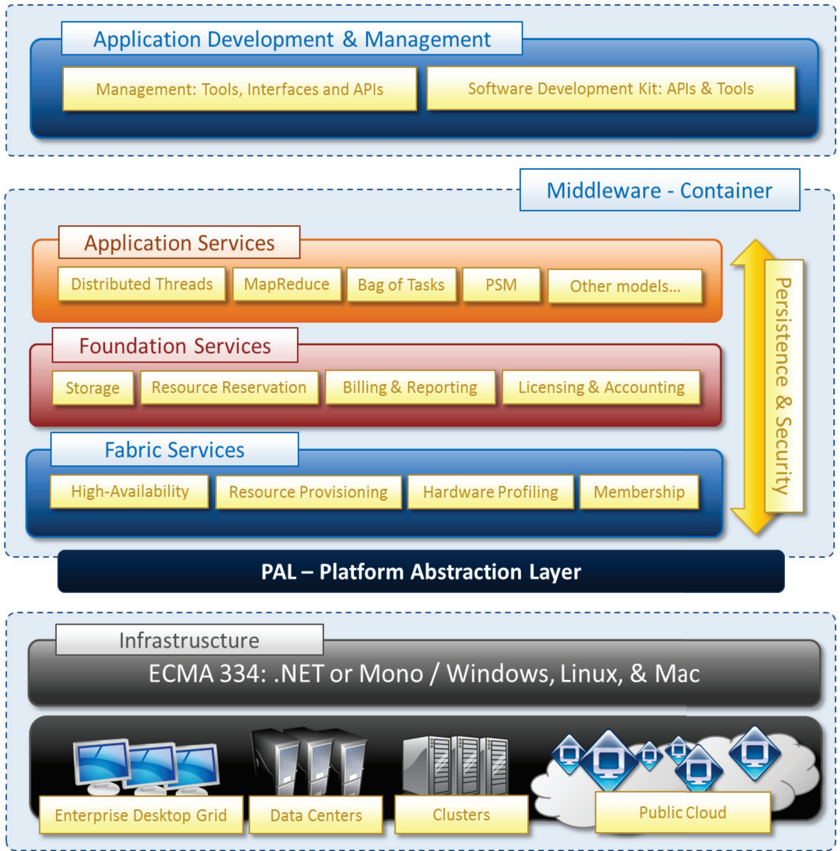


Fig.11.1 Overview of Aneka Framework

Fig.11.1 illustrates the overview of Aneka Framework. It has collection of physical and virtualized resources connected through a network, which are either the Internet or a private intranet. Each of these resources hosts an instance of the Aneka Container representing the runtime environment where the distributed applications are executed. The container provides the basic management features of the single node and leverages all the other operations on the services that it is hosting. The services are broken up into fabric, foundation, and execution services. Fabric services directly interact with the node through the Platform Abstraction Layer (PAL) and perform hardware profiling and dynamic resource provisioning. Foundation services identify the core system of the Aneka middleware, providing a set of basic features to enable Aneka containers to perform specialized and specific sets of tasks. Execution services directly deal with the scheduling and execution of applications in the Cloud.

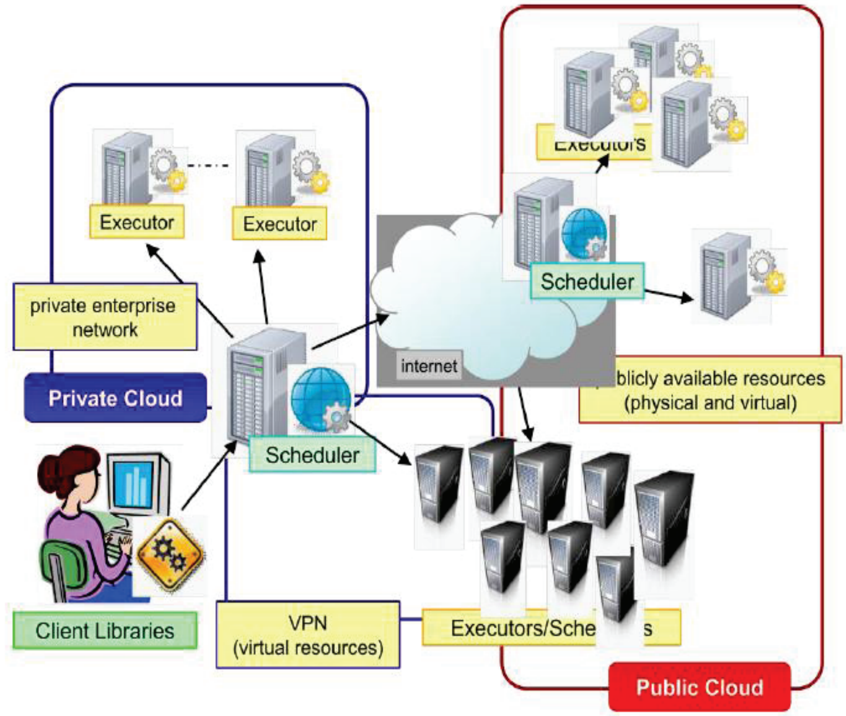


Fig.11.2 Typical Aneka cloud Deployment

A common deployment of Aneka is presented in Fig.11.2. It is constituted by a set of interconnected resources that are dynamically modified according to the user needs by using resource virtualization or by harnessing the spare CPU cycles of desktop machines. If the deployment identifies a private cloud all the resources are in house, for example within the enterprise. This deployment is extended by adding publicly available resources on demand or by interacting with other Aneka public clouds providing computing resources connected over the Internet.

11.4 SERVICE LEVEL AGREEMENTS

A Service-Level Agreement (SLA) is a contract component between a service provider and the client i.e. customers. It can define as level of service expected by a customer from a supplier. A SLA provides some specific aspects related to the services that the service providers are offerings. Agreements between Internet Service Providers (ISP) and customers are the best example for SLA. SLA is also known as an Operating Level Agreement (OLA). SLA Adopted in the late 1980s, are currently used by most industries and markets.

Earlier, in cloud computing all Service Level Agreements were negotiated between a client and the service consumer. Nowadays, with the initiation of large utility-like cloud computing providers, most Service Level Agreements are standardized until a client becomes a large consumer of cloud services. Service level agreements are also defined at different levels which are mentioned below:

- **Customer-based service level agreements:** The service provider and customer formulate an SLA based on the services that will be provided. For instance, an IT service provider may help your business with its payroll system or billing system. The SLA defines that relationship in detail.
- **Service-based service level agreements:** All customers working with a service provider receive similar terms. If you have a mobile service provider (and who hasn't?), it will indicate what services it routinely offers and what additional services are available to its clients as part of the package.
- **Multi-level service level agreements:** A single SLA can be divided into levels that specify a series of customers using a single service.

Few Service Level Agreements are enforceable as contracts, but mostly are agreements or contracts which are more along the lines of an Operating Level Agreement (OLA) and may not have the restriction of law. It is fine to have an attorney review the documents before making a major agreement to the cloud service provider. Service Level Agreements usually specify some parameters which are mentioned below:

- Availability of the Service
- Latency or the response time
- Service components reliability
- Each party accountability
- Warranties

Microsoft publishes the Service Level Agreements linked with the Windows Azure Platform components, which is demonstrative of industry practice for cloud service vendors. Each individual component has its own Service Level Agreements. Below are two major Service Level Agreements (SLA) described:

Windows Azure SLA:

Window Azure has different SLA's for compute and storage. For compute, there is a guarantee that when a client deploys two or more role instances in separate fault and upgrade domains, client's internet facing roles will have external connectivity minimum 99.95% of the time. Moreover, all of the role instances of the client are monitored and there is guarantee of

detection 99.9% of the time when a role instance's process is not runs and initiates properly.

SQL Azure SLA:

SQL Azure clients will have connectivity between the database and internet gateway of SQL Azure. SQL Azure will handle a "Monthly Availability" of 99.9% within a month. Monthly Availability Proportion for a particular tenant database is the ratio of the time the database was available to customers to the total time in a month. Time is measured in some intervals of minutes in a 30-day monthly cycle. Availability is always remunerated for a complete month. A portion of time is marked as unavailable if the customer's attempts to connect to a database are denied by the SQL Azure gateway.

11.4.1 Features of SLA

Service-Level Agreement (SLA) provides few some remarkable features include:

- Specific details and scope of provided services, including priorities, responsibilities and guarantees
- Specific, expected and measurable services at minimum or target levels
- Informal or legally binding
- Descriptive tracking and reporting guidelines
- Detailed problem management procedures
- Detailed fees and expenses
- Customer duties and responsibilities
- Disaster recovery procedures
- Agreement termination clauses

11.4.2 Components of SLA

The SLA should include components in two areas: services and management.

- Service elements include specifics of services provided (and what's excluded, if there's room for doubt), conditions of service availability, standards such as time window for each level of service (prime time and non-prime time may have different service levels, for example), responsibilities of each party, escalation procedures, and cost/service tradeoffs.

- Management elements should include definitions of measurement standards and methods, reporting processes, contents and frequency, a dispute resolution process, an indemnification clause protecting the customer from third-party litigation resulting from service level breaches (this should already be covered in the contract, however), and a mechanism for updating the agreement as required.

Check your Progress
1.What is Saas?
2.What is Aneka?
3.What Service Level Agreement?
4. List out some important elements of SLA.
5. Who use SLA?

11.5 ANSWERS TO CHECK YOUR PROGRESS

1. Security-as-a- service, or SaaS, is probably the most common type of cloud service development.

2. Aneka is an Application Platform-as-a-Service (Aneka PaaS) for Cloud Computing. It acts as a framework for building customized applications and deploying them on either public or private Clouds.

3. A Service Level Agreement (SLA) is the bond for performance negotiated between the cloud services provider and the client.

4. Elements of SLA:

    - Service description
    - Reliability
    - Responsiveness
    - Reporting procedure
    - Performance monitoring
    - Penalties for failure to meet obligations
    - Constraints

5. SLAs are very common in the IT world since companies often rely on external services such as cloud computing, hosting, and so on. However, almost any business relationship can be governed by a service level agreement.

11.6 SUMMARY

- Software as a service, or SaaS, is probably the most common type of cloud service development.

- The main aim of Aneka is to support open-ended set of abstractions and features for distributed computing and deployment scenarios.

- A service level agreement is a formal or informal contract between internal or external and the end user of the service. It specifies what the client will receive and clarifies what is expected of the service provider.

- Microsoft publishes the Service Level Agreements linked with the Windows Azure Platform components, which is demonstrative of industry practice for cloud service vendors.

11.7. KEYWORDS

Platform Abstraction Layer (PAL) and perform hardware profiling and dynamic resource provisioning.

SQL Azure clients will have connectivity between the database and internet gateway of SQL Azure.

Aneka is a workload distribution and management platform that accelerates applications in Microsoft .NET framework environments.

11.8 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Draw the architecture of Aneka.
2. What are the different levels parameters in Service Level Agreement?

Long Answer Questions

1. Write about Saas.
2. Write the case study of Aneka.
3. Explain about different Service Level Agreement in Cloud.

11.9 FURTHER READINGS

Arshdeep Bahga and Vijay Madisetti. 2014. Cloud Computing: A Hands-On Approach Hardcover. Publisher-Vijay Madisetti.

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www.geeksforgeeks.org

UNIT – 12
CLOUD STORAGE

Structure

12.0 INTRODUCTION

As we discussed in Section 9.5 Online File-Storage also referred cloud storage. Simply, it defined as “the storage of data online in the cloud”, where data is stored in and accessible from multiple distributed and connected resources over a network (typically the Internet). It’s delivered on demand i.e.with “anytime, anywhere” data access. This section discussed on cloud storage and its file system.

12.1 OBJECTIVES

After going this unit we will be able to

- Discuss about Cloud Storage.

- Understand the concept of Amazon S3.
- Explain about Cloud File System.

12.2 OVERVIEW OF CLOUD STORAGE

Cloud storage means storing of data in a remote location which is accessible from any device. Cloud Storage will improve efficiency and productivity in terms of backing up and securing the data. Cloud storage can provide the benefits of greater accessibility and reliability, rapid deployment, strong protection for data backup, archival and disaster recovery purposes. This is a form of networked data storage where data files are stored on multiple virtual servers. The servers used for cloud storage are typically hosted by third-party companies who operate large data centers. When we subscribe to a cloud storage service, we lease storage capacity from the cloud storage service. We then have access to the contracted amount of storage space, which we access via the Internet.

There are 2 types of storage devices. They are:-

- Black Storage Devices: Black Storage Devices offers raw storage to the clients. This raw storage is partition to create volumes.
- File Storage Devices: File Storage Devices offers storage to clients in the form of the files maintaining its own file system.

There are 2 types of cloud storage classes available:

- Unmanaged cloud storage: Unmanaged cloud storage means the storage is pre configured from the customer. The customer can neither format nor install its own fill system are change drive properties.
- Managed cloud storage: Managed cloud storage offers online storage space on demand. This system appears to the user to be a raw disk that the user can partition and format.

12.2.1 How does Cloud Storage works

Cloud storage is purchased from a third party cloud vendor who owns and operates data storage capacity and delivers it over the Internet in a pay-as-you-go model. These cloud storage vendors manage capacity, security and durability to make data accessible to your applications all around the world.

Applications access cloud storage through traditional storage protocols or directly via an API. Many vendors offer complementary services designed to help collect, manage, secure and analyze data at massive scale.

There are four main types of cloud storage personal, public, private and hybrid. These are all discussed in Section 9.4.2. This cloud storage offers a number of primary benefits as we discussed in Section 9.4.3.

12.2.2 Challenges of Cloud Storage

However, there are some risks and significant challenges when using cloud storage services. Main challenges are:

- **Reliability:** Cloud storage service doesn't have adequate infrastructure or doesn't maintain multiple backups, your data could be at risk.
- **Security:** This is crucial one. Protection of sensitive data is still complex because of its nature almost all data are in everywhere.
- **Access problems:** Because we're accessing your data over an Internet connection, we're in big trouble if that connection goes down either on your end or with your cloud storage provider.
- **Gravity:** Data has bulk, size, and weight. Unlike applications and compute, there is a difficulty in making data flexible and easily move it into the cloud.
- **Capability:** One of the biggest blockers to the use of cloud storage is the lack of enterprise capability, be it deploying file services, data protection, or simply the ability to present an interface with which an organization's IT team is familiar.
- **Wrong Selection:** Not choosing the right service provider. Depending on the size of your organizations it may make sense to look at smaller storage providers who will be able to give you more attention.
- **Data Leakage:** The cloud is a multi-tenant environment where you share resources with other clients. Even the gateway to the client's data is shared in the cloud, making it more vulnerable to security risks.
- **Performance:** Maintaining a strong security strategy should never affect the performance of the cloud. Both the encryption and decryption process should occur without adversely affecting performance.

12.3 CLOUD STORAGE PROVIDERS

There is no need for businesses to over-invest in the device memory. Cloud storage has made sharing and collaboration easier. Instead of storing on local storage drive going to store on cloud by free of cost or paid. Many cloud storage providers give accounts to businesses and not to individuals. This is because they have certain features which can be confusing for the individuals and those features will not be of much use to the individuals. Most popular Cloud Storage service providers are enlisted below:

12.3.1 Dropbox

Dropbox provides you with a modern workspace to keep your files together at one central place. It is accessible from anywhere anytime. With Dropbox, files will be accessible from computers, phones, and tablets.

Features:

- It allows you to share any file like PowerPoint and Photoshop.
- Dropbox Paper will allow you to create and share anything, from rough drafts, videos, images to code and sound.
- It can be used by freelancers, solo workers, teams, and businesses of any size.
- It allows you to share a big or a small file with anyone.
- Admin Controls will simplify your team management tasks.
- It allows you to secure access to the shared data.

Cons:

- It starts with only 2GB free data.

OS Platforms:

- Windows, Mac OS, Linux, Android, iOS, and Windows phone.

Price:

- It offers 2GB for free. Dropbox has two plans for individuals and two plans for teams.

12.3.2 Google Drive

Google Drive is popular because of its free storage capacity. You can store photos, documents, stories, designs, recordings, videos etc. To store the files on Google Drive you should have a Google account.

Features:

- It will allow you to store any file. You can store photos, drawings, videos, recordings etc.
- Files can be uploaded from any device like a smartphone, tablet, or computer.
- You can easily share files and folders. Collaboration on any file is possible without an email attachment.

Cons:

- Interface is a little bit confusing.

OS Platforms:

- Apps are available for Windows, Mac, iOS, and Android devices.

Price:

- It is free up to first 15 GB. It has more plans, and the pricing based on space you need.

12.3.3 Microsoft OneDrive

OneDrive provides free storage of up to 5GB to store your files and photos. These files and photos can be accessed from any device. It allows you to store the scanned documents directly on it. With OneDrive, any file is accessible on-demand from the Windows PC.

Features:

- It allows you to access the files in an offline mode.
- Files are accessible from any device.

- OneDrive provides SSL encryption.
- It is easy to share files and folders just by sending the link through text, email, Facebook, or iMessage.
- You will get the latest Office applications.

Cons:

- Only 5GB free storage is provided and it is very less when compared to Google Drive.

OS Platforms:

- The app is available for Windows, Android, iOS etc.

Price:

- OneDrive Basic is accessible for free with 5GB storage.

12.3.4 Box

Box provides a platform for the teams to store, share and collaborate on files. You can store documents, images, videos and much more. The content can be shared and accessed from anywhere.

Features:

- It allows you to store any type of files.
- Box Drive will allow you to work on your cloud files from your desktop.
- It will allow you to work online with others and you can also share the folders
- Large files can be shared through email or straight from the Box.

Cons:

- It is a bit costly than the others.

OS Platforms:

- Accessible from any device.

Price:

- It provides the following pricing plans. A trial is available for business plans.

12.3.5 iCloud

iCloud is Apple's service for providing cloud storage. You can store documents, photos, and music files. These stored files can be downloaded to iOS, Mac OS, and Windows devices.

Features:

- It works with many apps like Mail, Calendar, Contact, Reminders, Safari etc.
- Even the smallest change will appear everywhere.
- It allows you to collaborate with Pages, Numbers, Keynote, and Notes.
- It will let you pick up every conversation from where it is left. This feature will work even if you change your phone.

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Cons:

- To-do-lists, schedules, and presentation can be shared only with people who have Apple id.

OS Platforms:

- Windows, iOS, and Mac OS.

Price:

- 5GB is free to use. 50GB for $0.99 per month, 200GB for $2.99 per month, and 2TB for $9.99 per month.

12.3.6 OpenDrive

OpenDrive provides you the cloud storage with a lot of features like task management, cloud content management, and notes for individuals and teams.

Features:

- It provides cloud-based business tools for data management, project and workflow, user management, and branding.
- It has a desktop application for Windows.
- It is available for personal use with a lot of features like Online Storage, Online Backup, File Syncing and Online file sharing etc.

Cons:

- It provides limited support.

OS Platforms:

- The desktop application is available for Windows. Files can be synced from Windows, Mac, and Linux.

Price:

- It has pricing plans for personal use, businesses, and enterprises. The below table will tell you the details about the personal and business plans.

12.4 AMAZON SIMPLE STORAGE SERVICE (AMAZON S3)

Amazon Simple Storage Service (S3) is discussed in our Chapter 9.5 i.e. Online File-Storage and Sharing Services. Furthermore, this section contains some additional information regarding Amazon S3 and its advantages and features. It is storage for the Internet. It is especially designed to make web-scale computing easier for developers.

Amazon Simple Storage Service is Amazon S3 is a simple web services interface to store and retrieve any amount of data, at any time, from anywhere on the web. It gives highly scalable, reliable, data availability, security, fast, inexpensive data storage infrastructure and performance. This means customers of all sizes and industries can use it to store and protect any amount of data for a range of use cases, such as websites, mobile applications, backup and restore, archive, enterprise applications, IoT devices, and big data analytics.

This guide explains the core concepts of Amazon S3, such as buckets and objects, and how to work with these resources using the Amazon S3 application programming interface (API).

12.4.1 Advantages of Using Amazon S3

Following are some of the advantages of using Amazon S3:

- **Creating buckets:** Create and name a bucket that stores data. Buckets are the fundamental container in Amazon S3 for data storage.

- **Storing data:** Store an infinite amount of data in a bucket. Upload as many objects as you like into an Amazon S3 bucket. Each object can contain up to 5 TB of data. Each object is stored and retrieved using a unique developer-assigned key.

- **Downloading data:** Download your data anytime you like, or allow others to do the same.

- **Permissions:** Grant or deny access to others who want to upload or download data into your Amazon S3 bucket. Grant uploads and downloads permissions to three types of users. Authentication mechanisms can help keep data secure from unauthorized access.

- **Standard interfaces:** Use standards-based REST (Representational State Transfer) and SOAP (Simple Object Access Protocol) interfaces designed to work with any internet-development toolkit.

12.4.2 Amazon S3 Features

This section describes important Amazon S3 features.

- **Storage Classes:** Amazon S3 offers storage classes designed for different use cases. For example, Amazon S3 STANDARD for general-purpose storage of frequently accessed data, Amazon S3 STANDARD-IA (S3 Standard-Infrequent Access) for long-lived, but less frequently accessed data, and GLACIER for long-term archive.

- **Bucket Policies:** Bucket policies offer centralized access control to buckets on a variety of conditions, including Amazon S3 operations, requesters, resources, and aspects of the request (for example, IP address).

- **Amazon Web Services (AWS):** Identity and Access Management: It is a comprehensive, evolving cloud computing platform provided by Amazon. AWS Identity and Access Management (IAM) is for manage access to your Amazon S3 resources. For example, you can use IAM with Amazon S3 to control the type of access a user or group of users has to specific parts of an Amazon S3 bucket your AWS account owns.

- **Access Control Lists:** You can control access to each of your buckets and objects using an Access Control List (ACL).
- **Versioning:** You can use versioning to keep multiple versions of an object in the same bucket.

12.5 CLOUD FILE SYSTEM

Cloud File Storage (CFS) is a method for storing data in the cloud that provides servers and applications access to data through shared file systems. CFS is a storage service that is delivered over the internet based on pay-per-use basis. There are two main types of cloud storage services. Network Attached Storage (NAS) or file storage and Storage Area Network (SAN) or block storage.

Cloud storage file system is in the form of hierarchical structure it provides shared access to file data. Users can create, delete, modify, read, and write files and can organize them directory tree structure.

Most distributed file systems are built on the client-server architecture others are decentralized.

- **Client-server architecture:** Network File System (NFS) uses a client-server architecture, which allows sharing files between a numbers of machines on a network. The NFS protocol allows heterogeneous clients' processes, probably running on different machines and under different operating systems, to access files on a distant server, ignoring the actual location of files. This model is also called the remote access model, which is in contrast with the upload/download model:
    - Remote access model: Provides transparency, the client has access to a file. He send requests to the remote file (while the file remains on the server).
    - Upload/download model: The client can access the file only locally. It means that the client has to download the file, make modifications, and upload it again, to be used by others clients. The file system used by NFS is almost the same as the one used by UNIX systems. Files are hierarchically organized into a naming graph in which directories and files are represented by nodes.
- **Cluster-based architectures:** A cluster-based architecture solves some of the issues in client-server architectures where communication occurs between a cluster and a selected cluster head that collects the information obtained by in its cluster. When it comes to organizing a distributed file system for large data centers, such as Amazon and Google, that offer services to web clients allowing multiple operations (reading, updating, deleting, etc.) to a large number of files distributed among a large number of computers, then cluster-based solutions become more beneficial.

Two of the most widely used Distributed File Systems (DFS) of this type are the Google File System (GFS) and the Hadoop Distributed File System (HDFS). Storing file data in the cloud delivers advantages in three key areas:

Scalability: Although not every cloud file storage solution can scale, leveraging all the capabilities of the cloud, the most advanced solutions provide the ability to start with the capacity and performance you need today and grow your capacity as needed. No more over provisioning to try and anticipate future needs.

Interoperability: Many existing applications require integration with shared file services that follow existing file system semantics. Cloud file storage solutions offer a distinct advantage as there is no new code to write to have secure, shared file access.

Budget and Resources: Operating file services on-premises requires budget for hardware, ongoing maintenance, power, cooling, and physical space. Cloud file storage enables organizations to redeploy technical resources to other projects that bring more value to the business.

12. 6 MAPREDUCE

Hadoop MapReduce is a software framework and programming model suitable for processing of huge amounts data (multi-terabyte) in parallel, on large clusters of commodity hardware in a reliable manner. MapReduce programs are very useful for performing large-scale data analysis using multiple machines in the cluster.

Hadoop is capable of running MapReduce programs written in various languages: Java, Ruby, Python, and C++. The MapReduce algorithm includes two significant tasks, namely Map and Reduce.

In Map task a set of data and converts it into another set of data, where individual elements are broken down into tuples. Secondly, reduce task, which takes the output from a map as an input and combines those data tuples into a smaller set of tuples. As the sequence of the name MapReduce implies, the reduce task is always performed after the map job.

The major advantage of MapReduce is that it is easy to scale data processing over multiple computing nodes. Under the MapReduce model, the data processing primitives are called mappers and reducers.

Decomposing a data processing application into mappers and reducers is sometimes nontrivial. But, once we write an application in the MapReduce form, scaling the application to run over hundreds, thousands, or even tens of thousands of machines in a cluster is merely a configuration change. This simple scalability is what has attracted many programmers to use the MapReduce model.

MapReduce programming offers several benefits to help you gain valuable insights from your big data:

- Scalability: Businesses can process petabytes of data stored in the Hadoop Distributed File System (HDFS).
- Flexibility: Hadoop enables easier access to multiple sources of data and multiple types of data.
- Speed: With parallel processing and minimal data movement, Hadoop offers fast processing of massive amounts of data.
- Simple: Developers can write code in a choice of languages, including Java, C++ and Python.

12.6.1 Algorithm of MapReduce

Hadoop divides the job into tasks. There are two types of tasks:

i. Map tasks (Splits and Mapping)

- Input Splits: This is the very first phase in the execution of map-reduce program. An input to a MapReduce job is divided into fixed-size pieces called input splits.
- Mapping: In this phase data in each split is passed to a mapping function to produce output values.

ii. Reduce tasks (Shuffling and Reducing)

- Shuffling: This phase consumes the output of mapping phase. Its task is to consolidate the relevant records from Mapping phase output.
- Reducing: In this phase, output values from the shuffling phase are aggregated. This phase combines values from shuffling phase and returns a single output value. In short, this phase summarizes the complete dataset.

12.6.2 An Example for MapReduce

Map reduces logical data flow is the input data both the map and the reduce function has the particular structure and the map function is in the form of a (key, value) pair). The reduce functions receives the intermediate (key, value) pair) in the form of the group of intermediate values associated with one intermediate key (key, set of values).

The below example illustrates the working of MapReduce. Consider you have following input data for your Map Reduce Program.

Welcome to Hadoop Class
Hadoop is good
Hadoop is bad

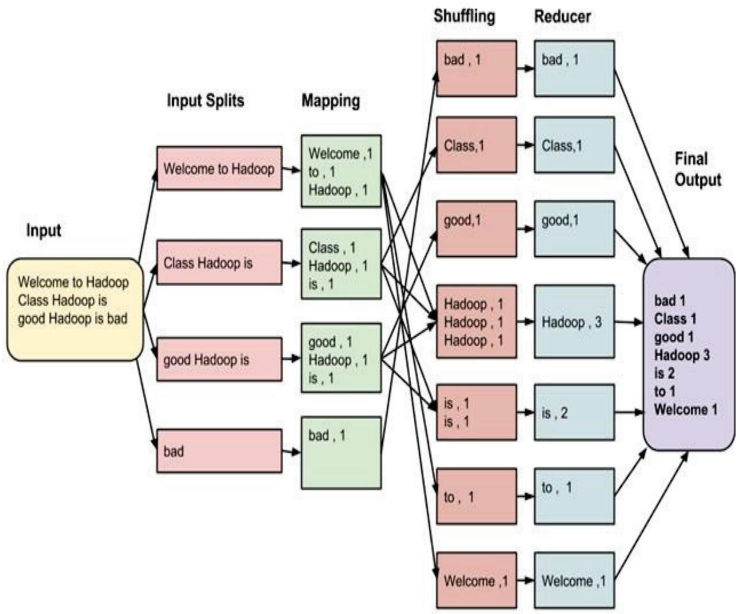


Fig.12.1 MapReduce Architecture

- The Fig.12.1 demonstrates MapReduce Architecture. In which the input is splits into multiple because the time taken to process a split is small as compared to the time taken for processing of the whole input. When the splits are smaller, the processing is better to load balanced since we are processing the splits in parallel.
- Data in each split is passed to a mapping function to produce output values. In our example, a job of mapping phase is to count a number of occurrences of each word from input splits and prepare a list in the form of <word, frequency>.
- The output of mapping phase is consolidated the relevant records from the output mapping phase. In our example, the same words are clubbed together along with their respective frequency.
- The output values from the shuffling phase are aggregated final output. Our example final output is:-

bad	1
Class	1
good	1
Hadoop	3
is	2
to	1
Welcome	1

12.7 HADOOP

Hadoop is an open-source software framework developed by Doug Cutting and Michael J. Cafarella. It is used for storing and processing Big Data in a distributed manner on large clusters of commodity hardware. Hadoop is an Apache open source framework written in java that allows distributed processing of large datasets across clusters of computers using simple programming models.

12.7.1 Hadoop Architecture

Hadoop has two core layers namely.

i. Processing/Computation layer (MapReduce)

   MapReduce is a parallel programming model for writing distributed applications devised at Google for efficient processing of large amounts of data (multi-terabyte data-sets), on large clusters (thousands of nodes) of commodity hardware in a reliable, fault-tolerant manner. The MapReduce program runs on Hadoop which is an Apache open-source framework.

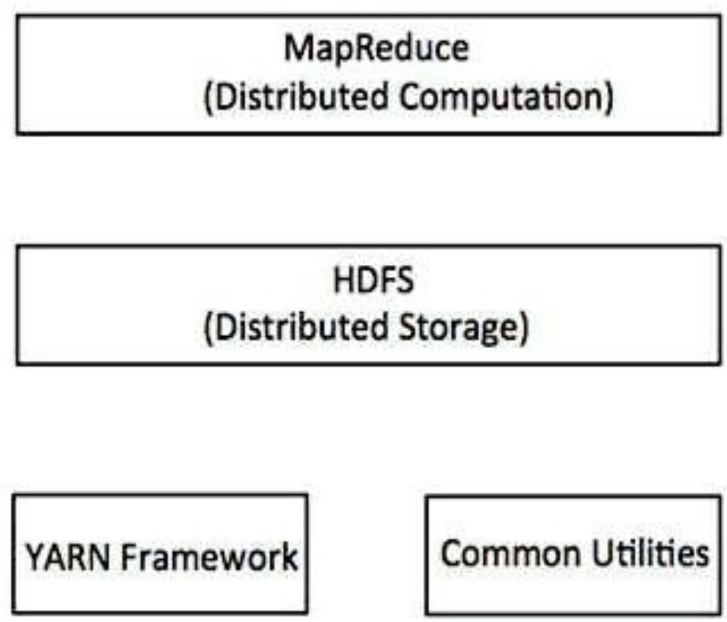


Fig.12.2 Hadoop Architecture

ii. Storage layer (Hadoop Distributed File System)

The Hadoop Distributed File System (HDFS) is based on the Google File System (GFS) and provides a distributed file system that is designed to run on commodity hardware. It has many similarities with existing distributed file systems. However, the differences from other distributed file systems are significant. It is highly fault-tolerant and is designed to be deployed on low-cost hardware. It provides high throughput access to application data and is suitable for applications having large datasets.

Apart from the above-mentioned two core components, Hadoop framework also includes the following two modules:

- Hadoop Common Utillities: These are Java libraries and utilities required by other Hadoop modules.
- Hadoop YARN: This is a framework for job scheduling and cluster resource management.

12.7.2 How Does Hadoop Work?

- Data is initially divided into directories and files. Files are divided into uniform sized blocks of 128M and 64M (preferably 128M).
- These files are then distributed across various cluster nodes for further processing.
- HDFS, being on top of the local file system, supervises the processing.
- Blocks are replicated for handling hardware failure.
- Checking that the code was executed successfully.
- Performing the sort that takes place between the map and reduce stages.
- Sending the sorted data to a certain computer.
- Writing the debugging logs for each job.

12.7.3 Hadoop Features

- **Reliability:** If one of the machines fails, another machine will take over the responsibility because of machines are working in tandem work in a reliable and fault tolerant fashion. Hadoop infrastructure has inbuilt fault tolerance features and hence reliable.

- **Economical:** Hadoop uses commodity hardware (like your PC and laptop). So, in small Hadoop cluster all nodes are in normal configuration. So, the cost of the project is pretty minimized. Suppose, you have used hardware-based RAID to should spend five times more at least. Also, Hadoop is open source software and hence there is no licensing cost.

NOTES



Fig.12.3 Hadoop Features

- **Scalability:** Hadoop has inbuilt capability due to the integration of cloud-based services. Therefore, while installing Hadoop on a cloud, don't need to worry about the scalability factor because of hardware setup might expand whenever required.

- **Flexibility:** Hadoop is very flexible in terms of ability to deal with all kinds of data. Where data can be of any kind and Hadoop can store and process them all, whether it is structured, semi-structured or unstructured data.

Check your Progress

1. What is Cloud Storage?
2. What are the Advantages and Disadvantages of Cloud storage?
3. What is Amazon S3?
4. Write the key features of Amazon S3.
5. What is Hadoop?
6. What Mapreduce?
7. Summarize MapReduce steps.
8. Write any five cloud service providers.

12.8. ANSWERS TO CHECK YOUR PROGRESS

1. Cloud storage is a form of networked data storage where data files are stored on multiple virtual servers.

2. Advanatges of cloud storage:
   - File storage in the cloud can be access at any time from any place so long as you have internet access.

- Another benefit is that cloud storage provides organization with off-side i.e.) remote backups of data. Which reduces is cost associated with disaster recovery.

Disadvantages:

- Unfortunately the biggest disadvantage to cloud storage is that users are limited by bandwidth
- It your internet connection is slow or unstable.

3. Amazon simple storage service if provide the simple web services. Interface that can be used stored and retrieve any amount of data at any time from any ware on the web.
4. Key features of Amazon S3:
    - Retied through geographic discussion design to provide 99.99999999 person durability and 99.999 person availability of object over a given year with chipper RRS returns retained storage.
    - per object URL's and ACL's access control list default download protocol of HTTP a bit protocol interface is provides to lower cost of high scale distribution.
    - First 1GB per month input or output in free and then dollar of $0.8 to dollar of $0.15 per GB for transfers outside and S3 regent.

5. Hadoop is an open source programming framework based on Java which supports the processing and storage of large volumes of data sets in a distributed computing environment. Hadoop is an open source implementation of map reduce coded and release in java rather than C by Apache. The Hadoop implementation of map reduce uses the Hadoop distribute file system (HDFS).

6. MapReduce is a processing technique and a program model for distributed computing based on java. The MapReduce algorithm contains two important tasks, namely Map and Reduce.

7. Summarize MapReduce steps:

    i. Data partitioning
    ii. Computation partitioning
    iii. Determine the master and workers
    iv. Reading the input data / data distribution
    v. Map function.
    vi. Compiler function.
    vii. Partitioning function.
    viii. Synchronization.
    ix. Communication.
    x. Sorting and grouping.
    xi. Reduce function.

8. Cloud Service Providers:

    - Appistry: The Appistriescloud queue platform is efficient in delivering a runtime application .

- Platform:This platform is very useful to create scalable and service oriented application.
- App scale:The App scale is open source platform for Google app engines app.
- ATNT:ATNT allows access to virtual servers and managers the virtualization infrastructure it includes network server and storage.
- Engine yard:The Engine yard is the application cloud computing platform.
- Anomaly: The Anomaly provides service is the IAAS platform

12.9. SUMMARY

- Cloud storage is a form of networked data storage where data files are stored on multiple virtual servers.
- Cloud file storage is a method for storing data in the cloud that provides servers and applications access to data through shared file systems.
- Hadoop is an open source programming framework based on Java which supports the processing and storage of large volumes of data sets in a distributed computing environment.
- MapReduce is a processing technique and a program model for distributed computing based on java. The MapReduce algorithm contains two important tasks, namely Map and Reduce.
- The Amazon Simple Storage Service (S3) provides unlimited online storage.
- Distributed file system have special requirements such as performance scalability, concurrency control, fall tolerance and security requirements to operate efficiently.
- HDFS Architecture has a master slave architecture containing single name nodes as the master and a number of data nodes as workers. To store file in this architecture HDFS split the file in to fixed size blocks and stores them on workers.

12.10. KEYWORDS

- **Cloud Storage** a form of networked data storage where data files are stored on multiple virtual servers
- **MapReduce** executes with map stage, shuffle stage, and reduce stage.
- **Hadoop** is an open source programming framework based on Java.
- **Map reduce engine** is the computation running on top of HDFS as its data storage manager
- To **read a file** in HDFS users sends an “open” request to the name node to get the location of file block.
- **Writing to the file** in HDFS a user sends a “create” request to the name node. To create a new file in the file system namespace.
  If the file does not exist. The name node notices the user and allows starting writing data to the files by calling the writing function.

12.11SELFASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions:

1. Write about Amazon S3.
2. What are the advantages Storing file data in the cloud?
3. Write the difference between Map Reduce and Hadoop.

Long Answer Questions:

1. Explain about Cloud Storage.
2. Explain about cloud file system.
3. Explain about Map Reduce and Hadoop.
4. Explain HDFS Architecture.

12.12 FURTHER READINGS

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BLOCK-V
CLOUD DEPLOYMENT TOOLS

UNIT – 13
OPEN SOURCE CLOUD PLATFORMS

Structure

13.0 INTRODUCTION

This unit discussed with the concept of Cloud Deployment Tools. Cloud Deployment Tools allows developers to easily design, deploy, and Reuse complex Cloud Platform solutions using simple and flexible Declarative templates. From simple web servers to complex highly available Clusters, Deployment Tools allows teams to spend less time Managing and more time building. Cloud deployment model represents the exact category of cloud Environment based on proprietorship, size and access.

As cloud technology is providing users with so many benefits, these benefits must have to be categorized based on users requirement. Most organizations implement cloud infrastructure to minimize capital expenditure & regulate operating costs.

13.1 OBJECTIVES

After going through this unit, you will be able to:

- Discuss the concept of Open source Cloud Platforms.
- Understand the Industry Adoption of Cloud Platforms.
- Explain the Characteristics of Open source Cloud Platforms.
- Discuss the concept of Eucalyptus.
- Explain the Key features and Components of the Eucalyptus.

13.2 STUDY OF OPEN SOURCE CLOUD PLATFORMS

Before enter into the open source cloud platforms, we must know Open source software. This is a kind of software allows developers to make its source code available to others who would like to view that code, copy it, learn from it, alter it, or share it.

In the early days, users played around with open source tools and technologies. Today, open source solutions are becoming most popular for many large enterprises. Though many open source tools are available today, the cloud is one of the hot favorites as its cost and operational advantages. Many cloud based platforms evolved during 2009-2010 and started incorporating many features that were offered 'as a service'.

An open source cloud describes that any cloud service or solution that is developed using open source technologies and software. This covers any public, private or hybrid cloud models providing SaaS, IaaS and PaaS that have been built and operate entirely on open source technologies.

An open-source cloud is designed and developed using open-source technologies and software such as:

- Open-source operating system, DBMS and software development frameworks
- Open-source workflow and business applications
- Virtualization stack (Hypervisor, virtualization management)
- Hardware with open-source firmware



Fig.13.1 Features of Open Source

Cloud computing must satisfy the following five essential principles

i. On demand services
ii. Access to a network

iii. Resource pooling
iv. Elasticity and
v. Measured services

To achieve these essential features, cloud computing provides three kinds of service models such as Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS) and Infrastructure-as-a-Service.

- Reduced cost and operational barriers to deliver business services.
- It minimises IT costs by reducing delivery times and improves the quality of the app development process.
- Changing business model – enterprises will soon become integrators of the best-of-the-breed services through collaboration.
- New regulatory requirements driven by a global collaborative economy and a need to address open markets.
- A digital explosion that is raising the bar to deliver a better customer experience.
- Transformation and optimisation across different process stacks sales, front-office, middle office and back office.

13.2.1 Characteristics of Open Source Cloud

The open source cloud has the following characteristics:

- No vendor lock-in and there is seamless integration of the enterprise applications, products and systems developed/deployed by different organizations and vendors.
- The source code will be made available for the community, for adopters and end users to study and modify the software and to redistribute copies of either the original or the modified version. Source code will also be free from any royalty.
- With no vendor monopoly, the use of free and open standards is possible. With data transferability and open data formats, there are greater opportunities to share data across interoperable platforms.
- Adoption of open source software enhances the interoperability with other enterprise solutions because the reuse of recommended software stacks, libraries and components is possible.

13.2.2 Popular Open source Platforms

There are number of popular cloud based open source platforms and frameworks. Some of these are:

OpenStack:

- OpenStack software is open source software for building and managing cloud computing platforms for private and public clouds.

- OpenStack software controls large pools of compute, storage, and networking resources throughout a datacenter, managed through a dashboard or via the OpenStack API.
- OpenStack is mostly deployed as Infrastructure-as-a-Service (IaaS), whereby virtual servers and other resources are made available to customers.

Cloud Foundry:

- Cloud Foundry is an open source cloud computing platform originally developed by VMware. It is now owned by Pivotal Software, which is a joint venture made up of VMware, EMC, and General Electric.
- This is an open Platform-as-a-Service (PaaS), which provides a choice of clouds, developer frameworks and application services.
- Cloud Foundry supports many languages and frameworks, including Java, js, Go, PHP, Python, and Ruby.
- Cloud Foundry makes it faster and easier to build, test, deploy and scale applications. It has different distributions. A popular one is Pivotal, from IBM.
- Application portability. Centralized platform administration, dynamic routing and Infrastructure security are some key features of Cloud Foundry.

OpenShift:

- Red Hat OpenShift is open source container application platform from Red Hat Inc. for the development, deployment and management of applications with an Integrated Development Environment (IDE).
- It is an application platform in the cloud, where app developers and teams can build, test, deploy and run their applications.
- Red Hat OpenShift available is four models
    - OpenShift Container Platform
    - OpenShift Online
    - OpenShift Dedicated
    - OpenShift.io

Cloudify:

- Cloudify is an open source cloud and end-to-end-platform originally created by GigaSpaces Technologies.
- It’s acting just like a middleware and to provide users a simple way to deploy applications or services in a cloud computing environment.
- It enables organisations to design, build and deliver various business applications and network services.

WSO2:

- This is a an open-source technology provider founded in 2006 by Sanjiva Weerawarana and Paul Fremantle
- It's a Platform-as-a-Service (PaaS) framework from the Apache community. It provides the elastic scalability feature for any type of service, using the underlying infra cloud.
- It offers an enterprise platform for integrating Application Programming Interfaces (APIs), applications, and web services locally and across the Internet.

Cloud Stack:

- This is another open source software platform for implementing cloud services and to manage the cloud computing environment.
- It is an Infrastructure-as-a-Service (IaaS) cloud computing platform.
- This platform is used by various service providers to offer public, private and hybrid cloud services.

13.3 EUCALYPTUS

Eucalyptus stands for Elastic Utility Computing Architecture for Linking Your Programs to Useful Systems. It is an open-source Linux-based software framework that provides the platform for private or hybrid cloud computing environment. Eucalyptus implements Infrastructure-as-a-Service (IaaS) methodology for solutions in private and hybrid clouds.
Eucalyptus was founded by the Computer Science Department at the University of California in 2009. Eucalyptus Systems announced a formal agreement with Amazon Web Services (AWS) in March 2012, allowing administrators to move instances between a Eucalyptus private cloud and the Amazon Elastic Compute Cloud (EC2) to create a hybrid cloud.

Eucalyptus provides a platform for a single interface so that users can calculate the resources available in private clouds and the resources available externally in public cloud services. It is designed with extensible and modular architecture for Web services. It also implements the industry standard Amazon Web Services (AWS) API. This helps it to export a large number of APIs for users via different tools.

Eucalyptus comes in two versions:

i. Open-core enterprise edition
ii. Open source edition

13.3.1 Components of Eucalyptus

- **Cluster Controller (CC):** Cluster Controller manages the one or more Node controller and responsible for deploying and managing instances on them. It communicates with Node Controller and

Cloud Controller simultaneously. CC also manages the networking for the running instances under certain types of networking modes available in Eucalyptus.

- **Cloud Controller (CLC):** Cloud Controller is front end for the entire ecosystem. CLC provides an Amazon EC2/S3 compliant web services interface to the client tools on one side and interacts with the rest of the components of the Eucalyptus infrastructure on the other side.

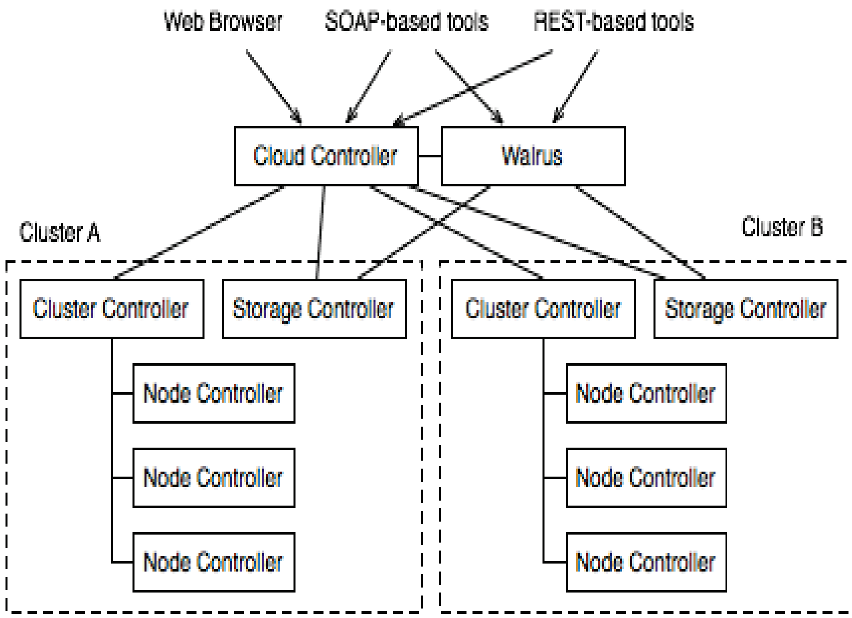


Fig.13.2 Fundamental Architecture of Eucalyptus

- **Node Controller (NC):** It is the basic component for Nodes. Node controller maintains the life cycle of the instances running on each nodes. Node Controller interacts with the OS, hypervisor and the Cluster Controller simultaneously.

- **Walrus Storage Controller (WS3):** Walrus Storage Controller is a simple file storage system. WS3 stores the machine images and snapshots. It also stores and serves files using S3 APIs.

- **Storage Controller (SC):** Allows the creation of snapshots of volumes. It provides persistent block storage over AoE or iSCSI to the instances.

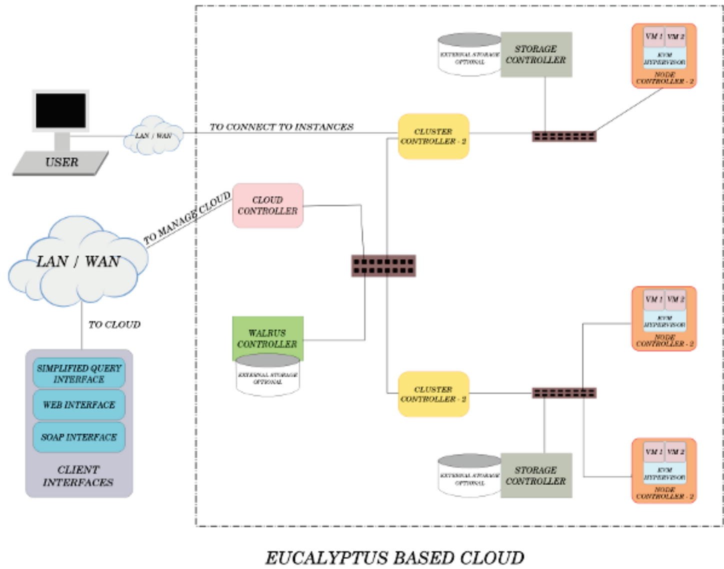


Fig. 13.3 Eucalyptus Cloud Computing Architecture

13.3.2 Eucalyptus Features

For implementing, managing and maintaining the virtual machines, network and storage Eucalyptus has variety of features.

- Secure Shell (SSH) Key Management
- Image Management
- Linux-based Virtual Machine (VM) Management
- IP Address Management
- Security Group Management
- Volume and Snapshot Management
- Support for multiple users with the help of a single cloud
- Support for Linux and Windows virtual machines
- Accounting reports
- Use of Web Service (WS) Security to ensure secure communication between internal resources and processes
- The option to configure policies and service level agreements based on users and the environment

Check your Progress

1.What do you mean Open-Source?
2.List out any five Open Source Platform.
3.What is Eucalyptus?
4.List any two important features of Eucalyptus.
5. Describe Eucalyptus Resource managers.

13.4. ANSWERS TO CHECK YOUR PROGRESS

1. Open-source cloud refers cloud service that provides Open- source software or service to end users or businesses.

2. OpenStack, Cloud Foundry, OpenShift,Cloudify and Cloud Stack are most popular Open Source Platforms.

3. Eucalyptus is an open source software platform for implementing Infrastructure as a Service of computing environment.

4. Two important featurs of Eucalyptus is IP Address Management and Security Group Management

5. Instant manager:Instant manager takes care of execution controlling and termination of the virtual machine.
   Group manager:Group manager performing the grouping of virtual information and its scheduling.
   Cloud manager: Cloud manager is the entire control handler of the cloud which managers the virtual resources and decision making.

13.5. SUMMARY

- Open-Source cloud platforms are used to developing, managing, and operating your applications requires a wide variety of technology services.
- It is designed into customers often ask us what represents a fully-functional flexible technology infrastructure platform.
- Eucalyptus can be used to get the advantages of both the public and private clouds.
- Users can run Amazon or Eucalyptus machine images as instances onboth the clouds.
- Support for multiple users with the help of a single cloud.
- The option to configure policies and service level agreements based on users and the environment.
- Support for Linux and Windows virtual machines.

13.6. KEYWORDS

Cloud computing provides three kinds of service models such as Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS) and Infrastructure-as-a-Service.

Cloud Foundry is an open source cloud computing platform originally developed by VMware.

Cloudify is an open source cloud and end-to-end-platform originally created by GigaSpaces Technologies.

Eucalyptus stands for Elastic Utility Computing Architecture for Linking Your Programs to Useful Systems.

Data centre or virtual to form virtual data centre as cloud provider to the user of web their as follows:-

- Eucalyptus
- Open nebula
- Nimbus
- V-Sphere

13.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. List the various types of cloud platforms.
2. Discuss the characteristics of open source cloud platforms.
3. List the Key features of a Eucalyptus?

Long Answer Questions

1. What are the Layers of Cloud platforms? Explain.
2. What are the components of the Eucalyptus?
3. Explain the various technologies in cloud platforms?

13.8 FURTHER READINGS

John W.Rittinghous, James F.Ransome, "Cloud computing:Implementation, Manegement and Security",CRC press 2010.

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https://mdshaonimran.wordpress.com/2011/11/26/eucalyptus-and-its-components/

UNIT – 14
NIMBUS AND OPEN NEBULA

Structure

14.0 INTRODUCTION

In this unit you will learn about the concept of Nimbus and Open Nebulla. Infrastructure clouds created a revolution in the outsourcing of computational resources: they enable users to provision resources customized to their needs, including the right software stack and execution privileges on a pay-as-you-go basis. But the ability to leverage this new outsourcing capability is still a challenge to many: users need to find ways to allow the on-demand resources to share security and configuration context, manage the deployment of potentially diverse platform, ensure reliability and scalability in the environment, etc. Nimbus Platform provides an integrated set of tools designed to overcome these challenges. Therefore, this unit discuss with Nimbus and Open Nebulla.

14.1 OBJECTIVE

After going through this unit, you will be able to:

- Explain the basic product of Nimbus.
- Discuss the goals of Nimbus
- Describe the components of Open Nebula.
- Explain the benefits of Open Nebula.

14.2 NIMBUS

Nimbus, from the Latin for "dark cloud", is an outdated term for the type of cloud now classified as the nimbostratus cloud. Nimbus is a powerful toolkit focused on converting a computer cluster into an Infrastructure-as-a-Service (IaaS) cloud for scientific communities. Being written in Python and Java, it is totally free and open-source software, released under the Apache License.

The Nimbus cloud client allows the users to provision customized compute nodes, called a workspace, and maintain full control over it using a leasing model based on the Amazon's Elastic Compute Cloud (EC2) service.

The Nimbus cloud-computing infrastructure allows scientists working on data-intensive research to create and use such virtual machines with a cloud provider. Nimbus also allows users to create multiple virtual machines to complete specific computational jobs that can be deployed throughout the cloud and still work in tandem with each other. This flexibility allows a user to configure a virtual machine and then connect it to resources on a cloud, regardless of who is providing the cloud.

14.2.1 Nimbus Platform tools

Nimbus Platform provides an integrated set of tools designed to overcome the challenges that are faces in product outsourcing. Primary aim of Nimbus is to enable users to move to the cloud quickly and effortlessly, automating and facilitating much of the process. Also aim to provide a bridge allowing a user to overlay familiar concepts, such as virtual clusters, onto the resources provisioned in the cloud. Recent Nimbus Platform tools are described below.

Cloudinit.d: cloudinit.d is a tool for launching, controlling, and monitoring cloud applications. If the application is simple or complex, single cloud or multi-cloud, VM based or bare metal, or any combination of the above, cloudinit.d is designed to make the management and coordination of that application easy

Phantom: Phantom is a service that provides auto-scaling and high availability for collections of resources deployed over multiple IaaS cloud providers allowing users to develop scalable and reliable applications.

Context Broker: The Context Broker is a service that allows clients to coordinate large virtual cluster launches automatically and repeatedly.

14.2.2 Goals of Nimbus

Nimbus project developers targeted the main three goals and their open source implementations:

- Give capabilities to providers of resources for private or community IaaS clouds development. The Nimbus Workspace

Service enables lease of computational resources by deploying virtual machines on those resources.

- Give capabilities to users for IaaS clouds application. Among Nimbus scaling tools for automatically scale across multiple distributed providers. The Nimbus Context Broker is especially suitable and robust for the same. It coordinates large virtual cluster launches automatically and repeatedly using a common configuration and security context across resources.

- Give capabilities to developers for extension, experimentation and customization of IaaS. For instance, the Workspace Service can support several virtualization implementations, resource management options and interfaces.

14.2.3 Basic Product of Nimbus

Nimbus consists of two basic products:

- Nimbus Infrastructure is an open source EC2/S3-compatible IaaS solution with features that benefit scientific community interests, like support for auto-configuring clusters, proxy credentials, batch schedulers, best-effort allocations, etc.

- Nimbus Platform is an integrated set of tools for a multi-cloud environment that automates and simplifies the work with infrastructure clouds (deployment, scaling, and management of cloud resources) for scientific users.

14.3 OPEN NEBULA

OpenNebula is a free, simple, powerful and flexible open-source middleware solution to build Private Clouds and manage Data Center virtualization. Over a decade of software releases and thousands of enterprise deployments, being widely used by industry and research leaders prove the growth of OpenNebula's.

Open Nebula is a cloud computing platform for managing heterogeneous distributed data center infrastructures. The Open Nebula platform manages a data center's virtual infrastructure to build private, public and hybrid implementations of infrastructure as a service. Nebula is widely used by variety of industries, including internet providers, telecommunication, information technology services, supercomputing, research laboratories, and international research projects.

14.3.1 The OpenNebula Deployment model

An OpenNebula deployment is modelled after the classic cluster architecture. Fig.14.1 shows the layout of the OpenNebula deployment model. It consists with following two important components.

i. A Front End (Master Node): A single gateway or front-end machine, sometimes also called the master node, is responsible for queuing, scheduling and submitting jobs to the machines in the cluster. It runs several other OpenNebula services mentioned below:
   - Provides an interface to the user to submit virtual machines and monitor their status.
   - Manages and monitors all virtual machines running on different nodes in the cluster.
   - It hosts the virtual machine repository and also runs a transfer service to manage the transfer of virtual machine images to the concerned worker nodes.
   - Provides an easy-to-use mechanism to set up virtual networks in the cloud.
   - Finally, the front-end allows you to add new machines to your cluster.

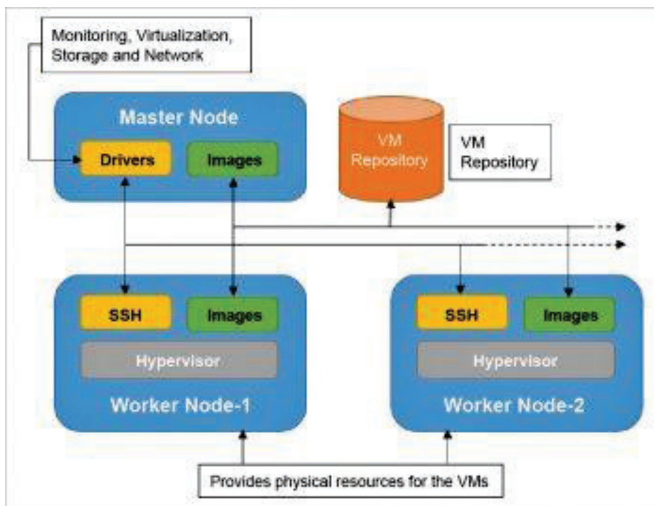


Fig.14.1 OpenNebula deployment model

ii. Hypervisor enabled hosts (Worker Node): The other machines in the cluster, known as 'worker nodes', provide raw computing power for processing the jobs submitted to the cluster. The worker nodes in an OpenNebula cluster are machines that deploy a virtualization hypervisor, such as Virtual Machine (VMware), Xen or Kernel-based Virtual Machine (KVM).

Three different data store classes are included with Open Nebula, including:

- System data stores: stores hold the images used for running the virtual machines. The images can be complete copies of an original

image, deltas, or symbolic links depending on the storage technology used.

- Image data stores: image data stores are used to store the disk image repository. Images from the image data stores are moved to or from the system data store when virtual machines are deployed or manipulated.
- File data stores: File data store is used for regular files and is often used for kernels, ram disks, or context files.

14.3.2 Components of Open Nebula

- Host: Physical machine running a supported hypervisor.
- Cluster: Pool of hosts that share data stores and virtual networks.
- Template: Virtual Machine definition.
- Image: Virtual Machine disk image.
- Virtual Machine: Instantiated Template. A Virtual Machine represents one life-cycle, and several Virtual Machines can be created from a single Template.
- Virtual Network: A group of IP leases that VMs can use to automatically obtain IP addresses. It allows the creation of Virtual Networks by mapping over the physical ones.

14.3.3 Benefits of Open Nebula

- It is 100 per cent open source and offers all the features in one edition.
- It provides control via the command line or Web interface, which is ideal for a variety of user groups and needs.
- Open Nebula is available for all major Linux distributions, thus simplifying installation.
- The long-term use of Open Nebula in large scale production environments has proven its stability and flexibility.
- Open Nebula is interoperable and supports OCCI (Open Cloud Computing Interface) and AWS (Amazon Web Services).

Check your Progress

1. Classify Nimbus product.
2. What is the main goal of Nimbus?
3. What do mean OpenNebula

14.4 ANSWERS TO CHECK YOUR PROGRESS

1. Nimbus can be classified into two products, namely Nimbus Infrastructure and Nimbus platforms.

2. Nimbus allows a deployment and configuration of virtual machines on remote resources to create an environment suitable for the user's requirements.

3. OpenNebula is a free, simple, powerful and flexible open-source middleware solution to build Private Clouds and manage Data Center virtualization

14.5 SUMMARY

- Open Nebula is an open-source tool for datacenter virtualization. It helps us to build any type of cloud: private, public and hybrid for data centre management. This tool includes features for integration, management, scalability, security and accounting of data-centre.
- Open Nebula is the cloud management tool which helps to synchronize the storage, network and virtual techniques, and also helps the users to deploy and manage virtual machines on physical resources according to the allocation strategies at data centers and remote cloud resources dynamically.
- Open Nebula is mainly used to manage the data centre of private cloud and infrastructure of cluster, and it also support hybrid cloud to connect the local and public infrastructure.
- This is very useful to build high scalable cloud computing environment. Open Nebula also supports public cloud platform by providing interfaces and functions to virtual machines, storage and network management.
- Nimbus is also an open source pre software package used for providing virtual networks with Amazon EC2 public cloud interface with EC2 window clients.

14.6 KEYWORDS

Open Nebula is a platform providing the ability to manage a pool of virtual resources. You can create virtual machines and configure them as you would configure a physical machine connected your network.

Nimbus is an open source cloud computing infrastructure that provides tools allowing users to deploy virtual machines on resources.

A **nimbus** cloud is a cloud that produces precipitation. Usually the precipitation reaches the ground as rain, hail, snow, or sleet. Falling precipitation may evaporate as virga. Since nimbus clouds are dense with water, they appear darker than other clouds. Additionally, nimbus clouds can be characterized by their great height. Nimbus clouds are formed at low altitudes and are typically spread uniformly across the sky.

Instant manager takes care of execution controlling and termination of the virtual machine.

Group manager performing the grouping of virtual information and its scheduling.
Cloud manager Cloud manager is the entire control handler of the cloud which managers the virtual resources and decision making.

14.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Discuss the different types of nimbus product.
2. Write the benefits of Open Nebula.
3. Discuss the components of Open Nebula.

Long Answer Questions

1. Explain the goals of Nimbus.
2. Describe the components and deployment model of Open Nebula.

14.8 FURTHER READINGS

R. Moreno-Vozmediano, R. S. Montero, and I. M. Llorente. Multi-Cloud Deployment of Computing Clusters for Loosely-Coupled MTC Applications.

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Sub. Code : 31343

MODEL QUESTION PAPER

DISTANCE EDUCATION

M.SC (INFORMATION TECHNOLOGY) EXAMINATION

CLOUD COMPUTING

Second Year - Fourth Semester

(CBCS-2018-19 Academic Year Onwards)

Time : 3 hours Max Marks :75

PART - A (10 x 2=20 Marks)

Answer All questions.

1. Define Cloud Computing.
2. List the companies who offer cloud service development.
3. Give some online To-Do list application names.
4. Write the use of Google Calender.
5. What do you mean online scheduling?
6. What is CRM?
7. What is Cloud Fedaration?
8. Write the purpose of SLA.
9. List out any five open source platform.
10. What do mean Nimbus?

PART - B (5 x 5 Marks = 25 Marks)

Answer all questions choosing either (a) or (b)

11. (a) Explain the benefits of Cloud Computing. (Or)
    (b) Discuss on Amazon EC2 and IBM cloud.
12. (a) Write note on collaborating on Grocery list. (Or)
    (b) Discuss on collaborating on task management.
13. (a) Explain the benefits of online word processing? (Or)
    (b) Discuss about the advantages of cloud storage.
14. (a) Briefly discuss about four level of cloud federation. (Or)
    (b) Write detail note on Aneka framework.
15. (a) Write about any two open source platforms. (Or)
    (b) Write short note on OpenNebula deployment model.

Part – C (3 x 10 = 30 Marks)

Answer any three questions.

16. Discuss in detail about the pros and cons of cloud service deployment.
17. Write note on Collaborating on group projects and events.
18. Explain online file-storage and sharing services.
19. Explain in detail Hadoop MapReduce framework with example.
20. Discuss about the Eucalyptus framework with architecture and components.

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